The Mariana Islands Training and Testing

Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS)
United States Department of the Navy

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NAVSEA
NAVAL SEA SYSTEMS COMMAND

Mariana Islands
Training and Testing Activities
Final Environmental Impact Statement/
Overseas Environmental Impact Statement

Volume 3,
Part 2

May 2015

MITT EIS/OEIS Project Manager
Naval Facilities Engineering Command, Pacific
258 Makalapa Dr., Ste 100
Pearl Harbor, HI 96860-3134

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

December 12, 2013

Naval Facilities Engineering Command, Pacific,
258 Makalapa Drive, Suite 100,
Pearl Harbor, HI 96869-3134,

Attention: MITT EIS/OEIS Project Manager

Subject: The Mariana Islands Training and Testing Environmental Impact Statement / Oversees Environmental Impact Statement, Guam and Mariana Islands (CEQ # 20130266)

The U.S. Environmental Protection Agency (EPA) is providing comments on the Mariana Islands Training and Testing (MITT) Draft Environmental Impact Statement (DEIS) / Oversees Environmental Impact Statement. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) and our NEPA review responsibility under Section 309 of the Clean Air Act.

EPA provided scoping comments for this project in a letter dated November 3, 2011. We support the Navy's goal for this action, to maintain military readiness. We emphasize the importance of the Navy's continued coordination with the National Marine Fisheries Service and the need to use the best available scientific information to assess the impacts of the project. Based on our concerns about alternatives, water resources and standard operating procedures and mitigation measures, we have rated the proposed alternative Environmental Concerns – Insufficient Information (EC-2). The enclosed Detailed Comments elaborate on these concerns and our recommendations.

We appreciate the opportunity to review this DEIS. When the Final EIS is released for public review, please send one hard copy and one electronic copy to the address above (mail code: CED-2). If you have questions, please contact me at (415) 972-3521 or have your staff contact Tom Kelly at kelly.thomasp@epa.gov or (415) 972-3856.

Sincerely,

Kathleen Martyn Goforth, Manager
Environmental Review Office

Enclosures: EPA's Detailed Comments
Summary of EPA's Rating Definitions

cc (via email): Valerie Brown, National Marine Fisheries Service
Anthony Montgomery, U.S. Fish and Wildlife Service

Alternatives

The Mariana Islands Training and Testing Study Area is composed of "at-sea ranges and land based training areas on Guam and CNMI," and "operating areas, and special use airspace in the region of the Mariana Islands that are part of the Mariana Islands Range Complex (MIRC) and its surrounding seas, and includes a transit corridor" (ES-1). Both action alternatives would nearly double the current at-sea training area (from 497,469 nm^2 to 984,601 nm^2, page 1-2). The proposed action, Alternative 1, would support an increase in baseline training, and Alternative 2 would support an even larger increase in training.

The DEIS states that the No Action Alternative, required by CEQ regulations, "would fail to meet the purpose of and need for the Proposed Action" (p. 2-54). EPA acknowledges the Navy's need to train and test to achieve its mission, the stated purpose and need for the action (p. 1-4). The DEIS further clarifies that the action implements the Navy's Fleet Readiness Training Plan, including four component phases (p. 1-5 to 1-8), and emphasizes the strategic importance of the range (p. 1-8 and 1-9). The DEIS does not, however identify the factors that led the Navy to conclude that the current range size is inadequate, or by extension, the factors that led the Navy to propose the expansion of the training area in the proposed action. We note that Alternative 2 also includes additional training beyond the proposed alternative, but does not propose expansion of the training area beyond the proposed alternative.

Recommendation for the FEIS:

- Identify the factors that led the Navy to determine the training area expansion necessary to meet the purpose and need for the Proposed Action.

Water Quality

The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States:2008[1] acknowledges sediment run-off as one of the most serious stressors affecting coral reefs in the Mariana Islands. Sediment impacts coral health by blocking light and inhibiting photosynthesis, directly smothering and abrading coral, and triggering increases in macro algae. Additionally, the Department of Defense has committed "to protect U.S. and International coral reef ecosystems and to avoid impacting coral reefs to the maximum extent feasible".[2]

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[1] Waddell, J.E. and A.M. Clarke (eds.), 2008. The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008. NOAA Technical Memorandum NOS NCCOS 73. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD.

[2] Department of Defense Policy Statement on Executive Order 13089, see Department of Defense Coral Reef Protection Implementation Plan < http://www.denix.osd.mil/nr/upload/dodbk5.pdf >

We are concerned by the potential for erosion by current activities at Farallon De Medinilla as well as the increased training of the proposed alternative. The 2008 range assessment that includes FDM indicates "a narrow submerged shelf with limited coral communities surrounds the island."[3] Per the Range Sustainability Environmental Program Assessment Manual, the range assessment did not assess the fate and transport of sediment, including munitions constituents, from the island.

Recommendations for the FEIS

- Discuss the impacts of erosion at FDM on near shore habitats;
- Provide maps showing coral reefs throughout the training and testing area (e.g. FDM, Santa Rosa Bank etc.)
- Discuss the results of the 5 year reassessment of Marianas Land-Based operational range complex (if available); and
- Consider the potential for mitigation measures at FDM (e.g. construction of settling basins, or moving range targets) to reduce sediment impacts.

Standard Operating Procedures and Mitigation Measures

The DEIS notes a provision of the 2009 proclamation creating the Marianas Trench National Monument:

> the Armed Forces shall ensure, by the adoption of appropriate measures not impairing operations or operational capabilities, that its vessels and aircraft act in a manner consistent, so far as is reasonable and practicable, with this proclamation. (p. 5-50)

The DEIS does not identify any measures adopted or proposed specifically for the purpose of ensuring that training in the National Monument is consistent with the proclamation.

Recommendation for the FEIS:
Identify the appropriate measures created in response to the presidential proclamation.

[3] Final Range Condition Assessment Marianas Land-Based Operational Range Complex Decision Point 1 Recommendations Report GUAM AND COMMONWEALTH NORTHERN MARIANA ISLANDS, May 2008 < http://www.denix.osd.mil/sri/upload/Final-Marianas-DP1-ES-Official.pdf>

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.

Western Pacific Regional Fishery Management Council

November 12, 2013

Naval Facilities Engineering Command, Pacific
Attn. MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100
JBPHH, HI 96860-3134

To Whom It May Concern,

Thank you for the opportunity to comment on the Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OES) for the Marianas Islands Training and Testing (MITT) area. The Western Pacific Regional Fishery Management Council (Council) reviewed the draft EIS/OES and acknowledges the actions taken by the Department of Defense (DOD) in putting out public notices of training activities, restricted areas, and leaving areas accessible to fishermen during training activities (e.g. Warning Area-517 offshore of Guam). However, we believe the DOD could be doing more in this regard.

For example, the EIS/OES identifies that the DOD will continue to work with the public on accessibility to areas within the MITT, but does not offer any proposed public activities or mechanisms to facilitate communication. With this mind, we maintain our recommendation identified in our November 2011 letter to Deputy Assistant Secretary of Navy, Donald Schregardus, that the US Navy should establish a Marianas fishing community advisory committee that focuses on issues associated with military activities and fisheries in the Marianas. Clear and consistent communication with the Marianas fishing communities will reduce confusion on where and when fishing is restricted during training activities as well as provide the Navy with information on areas that are important to fishermen.

The Council also believes that the draft EIS/OES could be enhanced by better describing the direct, indirect, and cumulative impacts to fishermen from military training activities. The primary example of impacts is the 0-12 nautical mile danger zone around Farrallon de Medinilla (FDM), whereby access by fishermen is prohibited during training activities. The draft EIS/OES identifies that fishermen were restricted from fishing within 0-12 nm 201 days in 2012, and prohibited from fishing from 0-3 nm around FDM all year around. FDM is a large bank that provides excellent habitat and fishing grounds for bottomfish such as the red-gill emperor. Closure of the FDM fishing grounds forces fishermen to fish in areas around Saipan and Tinian. These areas are subject to higher fishing pressure, thus increasing potential for lower catch rates and local depletion. The cumulative impact analysis should describe the impacts of training activities on fishing communities in regards to reduced fishing areas and timing of training activities with regards to fishing seasons.

The Council also reiterates its previous comments in its July 25, 2013 letter to the Pacific Naval Facilities Engineering Command regarding access and marine transit around Tinian. It is our understanding that the DOD is proposing to designate a safety zone that extends seaward from the shoreline to 3 nautical miles or more around the northern half of the island of Tinian. This area is proposed to be closed during live-firing practices. While the safety zone is described as an integral part of the training range, its proposed location would also include the western side of Tinian, restricting marine activities in that area during those times. The closure would prohibit boat travel during exercises, thus diverting passage from the traditional route, and forcing residents to transit a longer route, resulting in increased fuel costs and travel times. The Council suggests that the eastern side of the island would be a more appropriate place to designate a safety zone for military training activities.

The Council would also like to highlight that fisheries development in Guam and CNMI is important to the local economy and food security, and also serves to perpetuate the cultural fishing traditions of the Marianas. The DOD should be considering the potential impacts of its activities on the development of fisheries, which may include offshore FADs and longline fishing. Planning for compatible future uses of the marine environment should be a conducted in coordination with Guam and CNMI governments and other applicable agencies. Lastly, to potentially mitigate or compensate for the loss of available fishing areas in the Marianas within the MITT, the DOD should be working with Guam and CNMI government agencies to establish funding opportunities that support fisheries development.

Thank you for considering our comments on the draft EIS/OES.

Sincerely,

Kitty Simonds
Executive Director

cc: Honorable Eloy S. Inos, Governor of CNMI
Honorable Gregorio K. C. Sablan, Congressman
Mr. Arnold Palacios, CNMI Secretary of Land and Natural Resources

CENTER for BIOLOGICAL DIVERSITY

December 6, 2013

Naval Facilities Engineering Command, Pacific
Attention: MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

Online comment form:
http://mitt-eis.com/GetInvolved/HowCanICommentonthisEISOEIS/SubmitAComment.aspx

Re: Mariana Islands Training and Testing Activities ("MITT") Draft Environmental Impact Statement/Overseas Environmental Impact Statement

Dear MITT Project Manager,

Please accept these comments concerning the Mariana Islands Training and Testing Activities ("MITT") Draft Environmental Impact Statement/Overseas Environmental Impact Statement. These comments are submitted on behalf of the Center for Biological Diversity, a nonprofit conservation organization whose mission is to protect and restore endangered species and wild places through science, policy, education, advocacy, and environmental law. The Center has over 625,000 members and online activists, some of whom reside and/or recreate in the Mariana Islands.

The proposed action would result in the continuation and expansion of military training and testing activities that are causing significant adverse impacts to the natural environment of the Mariana Islands, adversely affecting numerous imperiled species and their habitat, and irreversibly impacting the marine environment. The Navy has a mandatory duty under the National Environmental Policy Act (NEPA) to evaluate the direct, indirect, and cumulative impacts of the proposed action and determine whether there will be unavoidable significant impacts. The Navy has failed to meet NEPA's requirements because it improperly limited the scope of the DEIS, failed to properly set forth and analyze the no action alternative and other reasonable alternatives, and failed to adequately assess and disclose the adverse environmental impacts of the proposed activities, and the effectiveness of proposed mitigation measures.

We are also concerned about the impacts of this proposal on marine mammals and threatened and endangered species, and whether this proposal will comply with the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). We request to receive copies of all MMPA and ESA related documents and correspondence with the expert agencies concerning this proposal.

I. The Navy Improperly Limited the Scope of the DEIS

The Council on Environmental Quality ("CEQ") has promulgated regulations to implement NEPA, found at 40 C.F.R. Part 1500. The CEQ NEPA regulations are binding on all federal agencies. 40 C.F.R. § 1507.1. NEPA requires agencies to use the criteria for "scope" that is set forth in the CEQ regulations in order to determine which proposals shall be the subject of a particular EIS. 40 C.F.R. § 1502.4(a). Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action, must be evaluated together in a single EIS. *Id.*

The CEQ NEPA regulations further define the proper scope of EISs, and mandate that connected, cumulative, and similar actions be assessed together in a single EIS. 40 C.F.R. § 1508.25. Actions are connected if they automatically trigger other actions which may require EISs, they cannot or will not proceed unless other actions are taken previously or simultaneously, or they are interdependent parts of a larger action and depend on the larger action for their justification. 40 C.F.R. § 1508.25(a)(1). Actions are cumulative if they will have cumulatively significant impacts. 40 C.F.R. § 1508.25(a)(2). And actions are similar if they have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. 40 C.F.R. § 1508.25(a)(3).

The Navy is currently moving forward with two separate proposals, which are being evaluated in two separate EISs that NEPA requires to be analyzed together in a single EIS. The MITT EIS and the Commonwealth of the Northern Mariana Islands (CNMI) Joint Military Training EIS are both assessing military training activities that would occur in the same region at the same time. Both of these proposals are interdependent parts of the Navy's overall military training and testing activities in this region, and are therefore connected actions that must be analyzed together in a single EIS. 40 C.F.R. § 1508.25(a)(1); *see Thomas v. Peterson*, 753 F.2d 754, 759 (9th Cir. 1985).

Moreover, both of these proposals will undoubtedly result in cumulatively significant impacts on numerous resources in the region, again requiring that they be analyzed together in a single EIS. 40 C.F.R. § 1508.25(a)(2); *Thomas v. Peterson*, 753 F.2d at 759 (NEPA requires that "cumulative actions" be "considered together in a single EIS"); *City of Tenakee Springs v. Clough*, 915 F.2d 1308, 1312 (9th Cir. 1990) (where "foreseeable similar projects in a geographic region have a cumulative impact, they should be evaluated in a single EIS"). Additionally, there is no question that both of these proposed actions share common timing and geography, again requiring that they be analyzed together in a single EIS. 40 C.F.R. § 1508.25(a)(3).

The Navy's decision to separate and segment these two closely related proposals into two separate EISs violates NEPA. 40 C.F.R. § 1508.25(a). The Navy must issue a revised DEIS, for additional public and agency comments, in order to properly consider both of the related proposals in a single EIS, including the two proposals' collective impact on the environment.

II. The DEIS' Alternatives Section is Inadequate

An EIS must include alternatives to the proposed action. 42 U.S.C. § 4332(2)(C)(iii); *see also* 42 U.S.C. § 4332(2)(E) (requiring agencies to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources"). The alternatives section is "the heart" of the EIS. 40 C.F.R. § 1502.14. The EIS must "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." *Id.*

NEPA requires agencies to "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." 40 C.F.R. § 1502.14(a). The existence of a reasonable but unexamined alternative renders an EIS inadequate. *Center for Biological Diversity v. U.S. Dept. of the Interior*, 623 F.3d 633, 642 (9th Cir. 2010). Moreover, an agency may not define a project so narrowly that it forecloses a reasonable consideration of alternatives.

NEPA also requires agencies to include consideration of a "no action" alternative. 40 C.F.R. 1502.14(d). The no action alternative is required in order to provide a baseline against which the action alternatives are evaluated. *Center for Biological Diversity*, 623 F.3d at 642. A no action alternative must be considered in every EIS. *Id.*

The NEPA alternatives requirements ensure that the decision maker "has before him and takes into proper account all possible approaches to a particular project (including total abandonment of the project) . . . only in that fashion is it likely that the most intelligent, optimally beneficial decision will ultimately be made." *Calvert Cliffs Coordinating Committee v. United States Atomic Energy Commission*, 449 F.2d 1109 (D.C. Cir. 1971).

In the MITT DEIS, the Navy fails to accurately set forth and evaluate the required "no action" alternative. 40 C.F.R. § 1502.14(d). The Navy claims in the DEIS that the no action alternative simply continues the ongoing training and testing activities, as defined in existing environmental planning documents. DEIS at ES-8. However, the Navy acknowledges that a primary purpose of the MITT EIS is to comply with the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA), as the Navy's permits and authorizations under these statutes will soon expire. Thus, a true no action alternative would take into account the impending expiration of these permits and authorizations, which would presumably result in scaled back training and testing activities in areas where marine mammals and/or threatened and endangered species are present in order to insure that no illegal takings would occur.

The Navy's assumption that under the no action alternative, the ongoing training and testing activities would continue despite the expiration of permits and authorizations under the MMPA and ESA, is arbitrary and capricious and violates NEPA. See *Center for Biological Diversity*, 623 F.3d at 642-43.

In the MITT Draft EIS, the Navy also fails to rigorously explore and evaluate all reasonable alternatives, and fails to develop and analyze a reasonable range of alternatives. 40 C.F.R. § 1502.14(a). The DEIS, for instance, fails to provide an alternative that would significantly reduce the predicted harm to the marine environment and wildlife in the region, and thus none of the alternatives were selected to "inform decisionmakers and the public" of how it could "avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1.

As an example of an action alternative that the DEIS failed to consider, the Navy admits that it "did not identify and carry forward for analysis any separate alternatives with predetermined geographic or temporal restrictions." DEIS at 2-51. The alternatives analysis must include, however, "appropriate mitigation measures." 40 C.F.R. § 1502.14(f). Mitigation measures for the Navy's training and testing activities, especially for marine mammals and threatened and endangered species, should include – or at least consider - geographic restrictions from sensitive areas. By failing to include any consideration of alternatives that impose such restrictions, as a component of the alternative's mitigation measures, the Navy is failing to rigorously explore and evaluate all reasonable alternatives, including appropriate mitigation measures.

In order to engage in an effective, meaningful NEPA process, the Navy must disclose and provide the opportunity for comment on all reasonable alternatives to the proposed project, including mitigation measures. By failing to consider and analyze a range of potential mitigation measures as part of the reasonable range of alternatives to the proposed project, the Navy is failing to disclose to the public and provide the opportunity for comment upon these measures, and failing to present to the decisionmaker the information necessary to make an informed decision.

We request that the Navy prepare a supplemental DEIS that includes a true and accurate no action alternative, and that includes additional action alternatives that would significantly reduce the environmental harm of the proposed activities.

III. The DEIS Failed to Provide Sufficient Information Concerning the Affected Environment and Environmental Consequences

Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. 40 C.F.R. § 1500.1(b). A primary purpose of NEPA is to "guarantee that the relevant information will be made available to the larger audience that may also play a role in both the decision-making process and implementation of that decision." *Robertson v. Methow Valley Citizens*, 490 U.S. 332, 349 (1989). "[T]he broad dissemination of information mandated by NEPA permits the public and other government agencies to react to the effects of a proposed action at a meaningful time." *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989).

A DEIS must fulfill and satisfy to the fullest extent possible all of the requirements established for a final EIS. 40 C.F.R. § 1502.9(a). If a DEIS is so inadequate as to preclude meaningful analysis, the agency must prepare and circulate a revised draft of

the appropriate portion. *Id.* The agency must make every effort to disclose and discuss in the DEIS all major points of view on the environmental impacts of the alternatives, including the proposed action. *Id.*

In addition to describing the environment of the area that would be affected by the proposed action, 40 C.F.R. § 1502.15, an EIS must analyze and disclose the environmental consequences of the proposed action should it be implemented. 40 C.F.R. § 1502.16. The "environmental consequences" section of the EIS "forms the scientific and analytic basis" for the comparison of alternatives. 40 C.F.R. § 1502.16. This discussion must include "the environmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented." *Id.* This section must include discussions of both direct and indirect effects and their significance, along with the environmental effects of the alternatives. *Id.*

"Direct effects" are defined as those that "are caused by the action and occur at the same time and place." 40 C.F.R. § 1508.8(a). In this case, the "direct effects" that must be analyzed and disclosed in the EIS include the taking of marine mammals, the taking of threatened and endangered species, the destruction and adverse modification of the designated critical habitat for threatened and endangered species, the disruption of marine systems and the resulting impacts to water quality and corals, and the direct impacts to the affected communities.

"Indirect effects" are defined as those that "are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." 40 C.F.R. § 1508.8(b). For the MITT EIS, "indirect effects" include the long term aversion of marine species from the destructed environment in and around the MITT, the unknown long-term impacts of toxic chemical build-up in the ocean, and the precedent that the continuation of these military training and testing activities sets for future attitudes and activities concerning this valuable marine area and the Mariana Islands.

A. The DEIS Fails to Adequately Address Impacts to Marine Mammals

Accurate scientific analysis is essential to implementing NEPA, 40 C.F.R. § 1500.1(b), and agencies must insure the scientific integrity of the analysis in EISs. 40 C.F.R. § 1502.24. The MITT DEIS needs to be updated to take into account new information concerning impacts to marine mammals, including the EIS for the U.S. Navy Training and Testing Activities in the Hawaii-Southern California Training and Testing (HSTT) Study Area; the 2013 scientific report, "Blue whales respond to simulated mid-frequency military sonar;"[i] and the 2013 scientific report, "First direct measurements of behavioral responses by Cuvier's beaked whales to mid-frequency active sonar."[ii]

The DEIS under-estimates and understates the likely extent of harm and impacts to marine mammals that would result if the proposed action is implemented. The Navy's

conclusion that no long term impacts to individuals or populations of marine mammals are expected as a result of sonar and other testing is not supported by the information presented in the DEIS as well as other scientific research. Models presented in the DEIS predict that each year over 50 marine mammals would be exposed to acoustic stress from sonar training and testing that would cause permanent hearing damage under Alternative 1. DEIS at 3.4-114 – 3.4-116. Moreover, sonar testing and training plus other sources of anthropogenic noise is predicted to cause thousands of cases of Level B and Level A harassment under the MMPA. *Id.*

Additionally, the DEIS understates the severity of behavioral responses on long term health. Dramatic behavioral responses to stressors from naval testing are well documented in the scientific literature.[iii] These responses can limit important activities such as foraging, communication, and predator detection.[iv] Behavioral responses may be temporary, but the long term consequences are not well understood. *See* 40 C.F.R. § 1502.22 (setting forth the NEPA requirements for when information concerning the potential environmental impacts of a proposed action is incomplete or unavailable).

The indirect effects of the Navy's activities on marine mammals are also not adequately considered in the DEIS. Stress is a key component of marine mammal health. A study of North Atlantic right whales indicated that chronic stress in whales may be associated with exposures to even low-frequency ship noise.[v] Stress from ocean noise combined with other factors may weaken a cetacean's immune system, making it more vulnerable to parasite and diseases that normally would not be fatal. It is also reasonable to consider the possibility that marine species may exhibit the same physiological effects as terrestrial species that have been exposed to moderate levels of noise. In those studies, chronic noise has interfered with brain development, increased the risk of myocardial infarctions, depressed reproductive rates, and caused malformations in young.[vi] Other indirect effects may arise from mother-calf separation leading to a decrease in survivability.

B. The DEIS Fails to Adequately Address Impacts to Water Quality, the Marine Environment, and Wildlife

The DEIS is unclear as to how toxic metals and pollution resulting from the continuation and expansion of military training and testing activities in the region will affect water quality, the marine environment, and wildlife. The Navy states that percentage increases for known toxic metals under Alternatives 1 and 2 cannot be evaluated because these proposed testing and training activities are not currently conducted under the No Action Alternative. The Navy also states that impacts on sediments and water quality would be long term, local and negative, but that federal and state guidelines would not be violated. The DEIS fails to provide the public and decisionmaker with enough information and analysis to gain a clear understanding as to how the marine environment and wildlife may be adversely affected by the introduction of more toxic chemicals and metals as result of the proposed project.

C. The DEIS Fails to Adequately Consider and Disclose Cumulative Impacts

In accord with NEPA, the Forest Service must "consider" cumulative impacts. 40 C.F.R. § 1508.25(c); *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1379 (9th Cir. 1998). "Cumulative impact" is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." 40 C.F.R. § 1508.7. "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." *Id.*

"To 'consider' cumulative effects, some quantified or detailed information is required." *Neighbors of Cuddy Mountain*, 137 F.3d at 1379. "Without such information, neither the courts nor the public, in reviewing the [agency's] decisions, can be assured that the [agency] provided the hard look that it is required to provide." *Id.* "General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided." *Id.* at 1380. "Nor is it appropriate to defer consideration of cumulative impacts to a future date," *id.*, as NEPA requires consideration of the potential impact of an action *before* the action takes place. 40 C.F.R. § 1500.1(b).

There is no question that the proposed military training and testing activities will contribute to cumulative impacts on numerous resources within the region when considered together with other past, present, and reasonably foreseeable activities, including the proposed CNMI Joint Military Training activities. The DEIS, however, provides only a general, non-quantified discussion of cumulative impacts, of the same type that the Ninth Circuit has found insufficient under NEPA. *See e.g., Neighbors of Cuddy Mountain*, 137 F.3d at 1379-80. The general statements provided in the DEIS fail to constitute the required hard look, and the Navy fails to provide an adequate justification as to why more definitive information could not be provided. *Id.*

IV. The DEIS Fails to Insure that the Project Will Comply with the ESA

The ESA is "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation." *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 180 (1978). "The plain intent of Congress in enacting this statue was to halt and reverse the trend towards species extinction, whatever the cost." *Id.* at 194. In enacting the ESA, Congress spoke "in the plainest words, making it abundantly clear that the balance has been struck in affording endangered species the highest of priorities, thereby adopting a policy which it described as 'institutionalized caution.'" *Id.* at 194.

"One would be hard pressed to find a statutory provision whose terms were any plainer than those in [Section] 7 of the Endangered Species Act." *Id.* at 173. "Its very words affirmatively command all federal agencies 'to *insure* that actions *authorized, funded*, or *carried out* by them do not *jeopardize* the continued existence' of an endangered species

or *result* in the destruction or modification of habitat of such species . . . This language admits of no exception." *Id.*

Pursuant to Section 7 of the ESA, each federal agency must consult with the United States Fish and Wildlife Service (FWS) and/or National Marine Fisheries Service (NMFS) to insure that its proposed activities are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat. 16 U.S.C. § 1536(a)(2).

Section 9 of the ESA prohibits any person from "taking" a threatened or endangered species. 16 U.S.C. § 1538(a)(1)(B); 50 C.F.R. § 17.31(a). The term "take" is defined broadly to include "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." 16 U.S.C. § 1532(19).

There are numerous threatened and endangered species within the study area that may be adversely affected by the proposed action, including the green sea turtle, hawksbill turtle, a number of endangered bird species, the mariana fruit bat, humpback whale, blue whale, fin whale, sei whale, and sperm whale. DEIS at C-33; 3.4-4 to 3.4-5. In addition, there are a number of candidate species under the ESA, including the Mariana eight-spot butterfly, Mariana wandering butterfly, four species of snails, and the Pacific sheath-tailed bat. DEIS at 3.10-7.

The Navy must formally consult with FWS and NMFS concerning the potential impacts of its proposed continuation and expansion of training and testing activities on all threatened, endangered, and candidate species in the region. The Navy must also not issue its decision concerning the proposed action until after the completion of the Section 7 consultation, and must incorporate into the proposed action all of the reasonable and prudent measures, and terms and conditions, that are set forth in the applicable biological opinions.

A. The Project Will Adversely Affect Coral Species

Currently, 40 species of coral that exist in the study area are proposed for listing as threatened or endangered under the ESA. In the DEIS and in its Section 7 consultation with NMFS, the Navy must address how their proposal would impact these coral species, not only in terms of their listing under the ESA, but also under the assumption that these corals have critical habitat that will be designated within the study area.

Corals are under severe threat all over the world. They are slow to adapt to habitat changes and have a limited ability to reproduce over large distances. 73 Fed. Reg. at 6897. Oceans are already experiencing a drop in pH, and this decreases the calcification of corals. Calcification rates of reef-building corals are expected to decrease 30-40% with a doubling of atmospheric carbon dioxide.[vii] Scientists predict that ocean acidification coupled with increasing ocean temperatures will destroy the world's reefs by mid-century.[viii] The proposed action would increase the number of vessels and activities in and near areas where threatened corals occur. The DEIS must consider and

disclose the combination of the grave threats to corals associated with global climate change and the adverse impacts of the Navy's proposed activities on corals in the region.

V. The DEIS Fails to Insure that the Project Will Comply with the MMPA

Numerous species of whales and dolphins are known or likely to be present in the study area, including five species of whales that are designated as endangered under the ESA and depleted under the MMPA: humpback whale, blue whale, fin whale, sei whale, and sperm whale. DEIS at 3.4-4 to 3.4-5. The Navy acknowledges in the DEIS, however, that despite its decades of conducting activities in the MITT region, there is a "paucity of systematic survey data" and "little is known about the stock structure of the majority of marine mammal species in the region." DEIS at 3.4-2.

The Marine Mammal Protection Act (MMPA), generally prohibits any individual from "taking" a marine mammal, which is broadly defined as harassing, hunting, capturing, or killing it. 16 U.S.C. §§ 1362(13), 1372(a). According to the DEIS, the Navy is seeking a 5-year Letter of Authorization from the NMFS pursuant to the MMPA for certain specified training and testing activities, acknowledging that the use of sonar and other active acoustic sources and explosives may result in Level A harassment and Level B harassment of certain marine mammals, and that the use of vessels may result in Level A harassment, including mortality, of certain marine mammal species. DEIS at 3.4-213. The DEIS fails to address, however, how the Navy would modify its proposed activities to insure no takings of any marine mammals should its request be denied.

According to the DEIS, the proposed training and testing activities that involve weapons firing, launch, and impact noise; vessel noise, aircraft noise; energy emissions; and impulses from swimmer defense airguns, are not expected to result in the harassment of marine mammals. DEIS at 3.4-213. Similarly, the proposed training and testing activities using inwater devices, seafloor devices, fiber optic cables and guidance wires, decelerators/parachutes, nonexplosive practice munitions, and other military expended materials are not expected to result in harassment of marine mammals. *Id.* And, secondary stressors, including the impacts to habitat or prey from explosives and byproducts, metals, chemicals, and transmission of disease and parasites, are also not expected to result in harassment of marine mammals. *Id.* The DEIS lacks sufficient support for these determinations, especially at the level and extent of the activities proposed under Alternative 1, and especially in terms of the synergistic impact of all these activities on marine mammals.

Overall, the Navy greatly underestimates the impacts that their proposed testing and training activities will have on marine mammals in the study area. As acknowledged, the mitigation measures proposed by the Navy will not be sufficient to eliminate "take" of cetaceans. And for some activities, it appears that the Navy proposes to reduce the mitigation that is currently in place in the MITT area while at the same time proposing to increase these potentially harmful training and testing activities under Alternative 1.

VI. Conclusion

The DEIS fails to consider the proper scope of the Navy's proposal, fails to consider and disclose a true no action alternative and assess a full range of reasonable alternatives, and fails to adequately analyze and disclose the environmental consequences of the proposal. The DEIS also fails to demonstrate and insure compliance of the proposed activities with the ESA and MMPA. The Center requests that a supplemental DEIS be prepared, with an additional opportunity for public comment.

Thank you for taking our comments into consideration, and please add me to the mailing list for this proposed action.

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[i] Goldbogen, J.A., Southall, B.L., DeRuiter, S.L., Calambokidis, J., Friedlaender, A.S., Hazen, E.L., Falcone, E.A., Schorr, G.S., Douglas, A., Moretti, D.J., Kyburg, C., McKenna, M.F., Tyack, P.L. Tyack, P. L. 2013. Blue whales respond to simulated mid-frequency military sonar. *Proc. Roy. Soc. B.* 280(1765), 20130657. doi:10.1098/rspb.2013.0657 (Goldbogen 2013).

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[iv] DeRuiter 2013; Goldbogen 2013; Tyack 2011.

[v] R. M. Rolland, S. E. Parks, K. E. Hunt, M. Castellote, P. J. Corkeron, D. P. Nowacek, S. K. Wasser, and S. D. Krauss. 2012. "Evidence That Ship Noise Increases Stress in Right Whales." *Proceedings of the Royal Society of Biology*. 10. 1098/rspb.2011.2429.

[vi] *See, e.g.*, E.F. Chang and M.M. Merzenich, Environmental Noise Retards Auditory Cortical Development, 300 Science 498 (2003) (rats); S.N. Willich, K. Wegscheider, M. Stallmann, and T. Keil, Noise Burden and the Risk of Myocardial Infarction, European Heart Journal (2005) (Nov. 24, 2005) (humans); F.H. Harrington and A.M. Veitch, Calving Success of Woodland Caribou Exposed to Low-Level Jet Fighter Overflights, 45 Arctic vol. 213 (1992) (caribou).

[vii] Kleypas, J.A., et al. 2006. Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers; Hoegh-Guldberg, et al. 2007. Coral Reefs Under Rapid Climate Change and Ocean Acidification, Science 318:1737-1742; Guinotte, J.M., Fabry, V.J. 2008. Ocean acidification and its potential effects on marine ecosystems. Ann. N.Y. Acad. Sci. 1134: 320–342.

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Prepared by: The Guam Fishermen's Cooperative Association
December 11, 2013

The following is in response to the Mariana Islands Training and Testing (MITT) Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) and its potential impact to the Guam's Marine Community. We use the word community as all-encompassing as the past and proposed Actions/Designations impacts not just affect fishermen but everyone including tour operators, economic expansion opportunities for the aforementioned and the consumers of the fresh seafood and services provided by such. While we recognize the needs of the military, most especially the necessity of training the basic tenants of the National Environmental Protection Act and other Federal Edicts must not be ignored. Recognize while some of these ranges may have been pre-existing; such may not be the case or applicable today. We certainly feel the continued existence or expansion is certainly not in the best interest of the community. These pre-existing and proposed ranges need greater thought especially as times change and opportunities are recognized by our small fragile Island community and economy. We ask that that your organization continues to work with the community as partners and as adversaries. To this end; we offer our concerns and recommendations which are as follows:

Preamble: Facts about Guam's Marine community:

Fishing community:

Primarily a small boat community with an average vessel size of 22 feet. Fishing duration is usually a day trip (sunrise to sunset) with an extremely small percentage overnight trips (on a given day as many as 40-50 vessels are operating in coastal waters). It is primarily a Subsistence Fishery where the catch is shared or sold to cover fishing cost; not considered a commercial or recreational fishery…"an expense fishery" is far more acceptable but poorly understood even in Western Terms.

This fishery depends highly on seasonal appearances of pelagic, coral reef and bottom fish species. Majority (70%) of the fishing trips are coastal, primarily within 5 miles but no further than 10-15 miles from the nearest coastline except for trips to nearby seamounts. During summer months where the waters are calmest these small boats may venture to these nearby seamounts to do some shallow bottom or fish for resident pelagic fish. Guam's community depends highly on these small fishing vessels for fresh local fish. Recognize that unlike Hawaii there are no Industrialized Fishing Vessels on Guam. Fishing on Guam is a four thousand year old tradition…a way of life for the fishermen and most especially in meeting the fresh fish needs of the community.

Recognize that the multitude of existing activities and designations already hampers the uses of Guam's Marine Resources. These existing areas are: The two large Marine Protected Areas hosted by the Government of Guam on the Western seaboard, the Military Firing Range Danger Zone near Orote, in addition the Safety and Security Zone Designation of Apra Harbor. There are Marine Conservation Areas to the Northwest sector (USFWS) with a soon to be designated Ritidian Firing Range for the Marine Corps Contingent. At the end, nearly 30 to 40 percent of

the Fishable Areas are either have or will have fishing access restrictions. Again, the western seaboard is where more than 80% of the marine community activities occur.

Lastly, realize that the Military for the most part does not allow fishing activities to occur in or around its shoreline. This poses a dilemma as an active contingent of military personnel are engaged in fishing as well as other marine activities (hence the 20 million dollar improvements to Sumay Cove Marina, certainly not for military vessels) placing additional pressure on an ever shrinking area. In addition, the US negotiated Compact Agreement with the Freely Associated Island States primarily for military access to their respective Zones has provided for these citizens to freely travel to the US. As a result, these FAS Citizens are now impacting Guam's marine resources on a near daily basis. At the end, the cumulative burden to support the needs of the military should not be placed on the shoulders of this small Island Fishing Community.

Others in the Marine community:
Marine Tour Operators service nearly three thousand tourists a day. These vessels like fishing ones operate with limited range and time with customer satisfaction its goal in order to ensure continued patronage. Majority of these vessel offer coastal dolphin viewing, diving, fishing and so forth. These vessels (at least 30 vessels on a given day) operate out of Hagatna Marina, Apra Harbor and Agat Marina on a daily basis. Conducting Military exercises in or adjacent waters limits the range or the activities of these vessels. Lastly, these vessels are too limited in range and duration and any impediments to their operation is a significant drawback to an already fragile operation.

One needs to understand the meaning of a "fragile operation" in order to fully understand marine operations both in fishing and other marine entities. Fragile, since all are subject weather (Guam averages 10 small craft warnings a month…tours do not like seasick passengers). Second, is visitor arrival as in the case of fishing…fish seasonality and duration which could be good or for the most part bad. High fuel cost especially higher than military fuel consumers giving military owned fishing vessels a higher economic advantage.

Vessel Operations:
The local boating community operates from boats with limited range and duration while the military has ships with a far greater range and duration not to mention funding. Therefore special it is far more conceivable that these military vessels should have operational ranges beyond the scope of the local small vessels.

1. Firing Ranges in General:

Land and Sea Firing Ranges should be conducted in areas where there is less intrusion on community activities.

a. Land Based Firing Ranges should be limited to small arms live-fire. Weapons such hand guns, shot guns and low-load munitions for rifles. The effective range of these types of fire arms would decrease the need for the extended Ocean Surface Danger or Danger Zone. Recognize that the Island of Tinian has already been designated as a Firing Range for all personnel weapons training. All military personnel in need of the higher caliber weapons training could either jump on a Military Aircraft (travel time 30 min.) or one of the new Hydro-Foil Deployment Watercraft (travel time 1hr. 30min.) just after a hearty breakfast. Landing in Tinian before the food is digested then conduct weapons training and be back on Guam for a

nice hot supper. Recognizing that it is a Joint Marianas Region under one supposedly Command (Navy).

b. Ocean Ranges (Mines and Live-fire) either should be limited to existing designated Ocean Training Areas (i.e. W517) or Ocean areas beyond fifty (50) miles of the Island of Guam or seamounts (reefs). The fifty mile zone is a commonly used buffer for both fishery management and conservation strategies in order to lessen Impacts to both pelagic and reef like species. Impacts by such proposed military activities largely remain unknown (especially during seasonal appearances) and not likely to be analyzed. However, it has been noted by fishermen that where there is active military training occurring fishing seems to be poor even in fishing "Hot Spots".

2. The Orote Pt. Danger Zone:

Historical usage: The Orote Point Area:

This area has been used for trolling pelagic fish as it is a natural aggregation area and a natural protected area where boaters can safely operate especially during rough sea conditions (4-5 months a year). It is an area almost equal-distant to the two busiest and only civilian marinas on the western seaboard (Hagatna and Agat). There are good bottom fishing areas (seamount) within the Danger Zone and since stopping is not allowed thus rendering these areas as inaccessible to fishermen.

In order for one to truly analyze the impacts by the Action, one must first understand the seasonality of fish; bottom fish, reef fish and pelagic fish and their range. By and large nearly all aggregate around Points where the Island extrudes out. These areas are ***Cocos Pt. Facpi Pt., Orote Pt., Hospital Pt., Two Lovers Pt., Haputo Pt., Ritidian Pt. and Pati Pt.*** These extrusions serve as the fishing "Hot Spots" for fishermen and with Cocos, Orote Tip and Ritidian primarily closed about 4 months in a given year; the inner areas such as the Orote Pt. Danger Zone lessens the already limited fishing grounds.

The following factors must also be considered in any designation: The area encompassed by the Orote Danger Zone is also an area of safe refuge similar to Double Reef as water conditions too often change in a moment. In addition, Fishermen transiting the DZ will be running surface lures but will have to stop or slow down to land the fish which is contrary to current edicts.

Recommendations:

A.The range should be over-looking the entrance to Apra Harbor and designated as a Small Arms Range (pistols only) or designated Orote Pt. Range could be shifted 90 degrees to the North and the "Danger Zone" limited to land areas. This shift would not impact the land area as it is already part of the "Ammo Wharf Danger Zone".

b. The range could be easily converted to an indoor range; recognizing that the range is on a Naval Base and Naval Personnel have a much lesser weapons familiarization requirement than the Marine Corps or Army Service Branches; also recognizing that the Marines are planning their own range at Ritidian and the Air Force operates a Firing Range with minimal impact to the marine community. These segregated Service Branch Ranges makes one wonder if there is truly

a single military command or that effective use of limited US financial resources is being realized. We feel that with proper planning and funding the placement of an indoor firing range would more than meet the US Navy Training requirements. It is our understanding that 20 million dollar Marina and an 18 million dollar dog kennel received full funding; another 20 million dollars for an indoor range would be far more appropriate use of DOD Funds.

I. In-door Firing Range: such a facility could have the following features: Weather controlled environment (wind, rain and other conditions), controlled lighting (day and night simulations) and lastly an environmentally friendly range where projectiles, casings and gases do not impact the land, air and sea; most especially the boating community.

c. In the event the aforementioned recommendations are unsuitable we offer the following enhancement programs:

I. Marker Buoys set up ½ to one mile from the outer boundaries as designated as the Danger Zone for the Orote Range. Kindly recognize that many coastal boaters do not have a GPS. The placement of these Marker Buoys may compensate for the loss of pelagic fishing opportunities but more so alleviates encursions.
II. Signage at both Marinas for notification that Range is Hot.
III. Suggest working with NOAA Weather to include the Range "in-use" notices.
IV. Suggest the Orote Danger Zone be changed to a Surface Danger Zone.

3. Proposed Ocean Small Arms Firing Range:

Historical Usage:

The area encompassed by the Proposed Range included traditional fishing grounds. Schooling fish have been frequently found in this area. The Department of Agriculture Fish Aggregating Devices (FADs) is in close proximity to the proposed range. The Proposed Range is also located just outside the largest Marina on the western seaboard and would limit resource access by the boaters as normal range is 12-15 miles from the Marina. This area is also host to a variety of "protected" marine mammals; whales and dolphins that visit the area frequently (most important for the array of Tourism vessels).

Recommendation:

Relocate the Proposed Ocean Firing Range within or to closer the Ocean Dredge Material Disposal Site as designated by the US EPA. This area is already designated and therefore additional exclusion areas unnecessary. Naval Vessels will need to take a direct heading out of Apra Harbor and designated Shipping Lanes without interacting with local vessels (note that there a safety buffer area requirement around all Naval Vessels).

Note: In the event the aforementioned recommendation is unsuitable or acceptable relocation we offer the following enhancement programs:

I. Marker Buoys set up 1/2 mile from the outer boundaries as designated as the Danger Zone for the Ocean Firing Range. Kindly recognize that many coastal boaters do not have a GPS and if they do the markings would clutter the screen.
II. Signage at both Marinas for notification that Range is Hot.
III. Suggest working with NOAA Weather to include the Range info.

4. Agat Bay Mine Neutralization Site and Piti Floating Mine Neutralization Site:

Historic Usage:

These areas are frequently used by all boaters from fishermen to Tourism engaged vessels. The latter is also located in close proximity to a Local Fishing Preserve where is has been scientifically documented that the coral fish larvae disperse into the Piti Zone. Tourism dive boats also frequent the area either for transit or an expedition where the latter occurs several times daily.

Recommendation:

Relocate the Proposed Mine Neutralization Sites is relocated within or to closer the Ocean Dredge Material Disposal Site as designated by the US EPA. Again, this area is already designated and therefore additional exclusion areas unnecessary. Naval Vessels will need to take a direct heading out of Apra Harbor and designated Shipping Lanes without interacting with local vessels (note that there a safety buffer area requirement around all Naval Vessels (500 yds.). Recently, the number of Military vessels operating within the 15 miles of Guam is ever increasing. This increased presence also adds to the reduction of fishing grounds not to mention the aerial exercises which causes seabirds to dissipate. Note that seabird aggregation is a tell-tale sign that pelagic schools of fish are in the area…aiding fishermen in the hunt.

Note: In the event the aforementioned recommendation is unsuitable or acceptable relocation we offer the following enhancement programs:

I. Marker Buoys set up ½ to one mile at 1 mile intervals from the outer boundaries as designated as the Danger Zone for the Mine Neutralization Sites. Kindly recognize that many coastal boaters do not have a GPS and if they do the latitude/longitude markings would clutter the screen.

II. Signage at both Marinas for notification that Range is Hot.

III. Suggest working with NOAA Weather to include the Range info.

In closing, while in full support of the US Military Training needs we feel there is a need to establish a cooperative balance between the needs of the military and the community. We have presented to you our limitations and graciously forgo the areas beyond such limits. We feel the recommendations aforementioned to be reasonable and should be considered in the Site selection and Environmental Impact Assessment.

Respectfully submitted on behalf of the Guam Fishermen's Cooperative Association,

Manuel P. Duenas II
President

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December 12, 2013

Naval Facilities Engineering Command Pacific
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Mariana Islands Range Complex EA/OEA
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Naval Facilities Engineering Command, Pacific
258 Makalapa Drive, Suite 100
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Phone: 808-472-1402

Dear Sir or Madam:

I write on behalf of our local grassroots organization named GUATDIA'N GANI - LEGHLIGHIIL GANI (GUARDIANS OF GANI).

First of all, we would like to thank you for the opportunity to submit our comments. The local people and residents of the Northern Mariana Islands (NMI) have made it abundantly clear that we have been ignored for so long when it comes to soliciting comments from our local community. We have long felt that the outreach efforts of the military have been largely lacking and meaningless.

Secondly, we would like to extend our untiring support for our troops serving the armed forces of the United States of America, most especially, to our Chamorro and Carolinian brothers and sisters who are sons and daughters of our spectacular Northern Mariana Islands. We also give our love and support to their spouses and children for making their own sacrifices at home while they await for their loved ones to return from tour duty and/or training abroad.

In response to the proposed expansion of the danger zone on Farallon de Medinilla (FDM), GUARDIANS OF GANI is unequivocally opposed to such. We respond as so mainly because the Commonwealth of the Northern Mariana Islands (CNMI), in our view, has made significant and long standing impacts since the signing of the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America. Since 1976, the year the covenant was enacted, the people of the CNMI have sacrificed not only our lands and resources, but also our Carolinian and Chamorro brothers and sisters who have paid the ultimate price in serving our country and the nation's security.

Three alternatives were analyzed in your draft EIS/OEIS:

• The No Action Alternative represents those training and testing activities as set forth in previously completed environmental planning documentation.

• Alternative 1 consists of the No Action Alternative, plus the expansion of Study Area boundaries and adjustments to location, type, and tempo of training and testing activities, which includes the addition of platforms and systems.

• Alternative 2 consists of all activities that would occur under Alternative 1 plus adjustments to the type and tempo of training and testing activities.

We submit that you adopt the NO ACTION ALTERNATIVE.

On June 15, 2013, the U.S. Navy issued its Environmental Assessment/Overseas Environmental Assessment (EA/OEA) Finding of No significant Impact/Finding of No Significant Harm (FONSI/FONSH) with regard to its proposed Mariana Islands Range Complex Airspace Modification. Although this document stipulates "adherence to the July 2010 Record of Decision (ROD) with respect to considered and approved military training activities," and that this EA/OEA is in "compliance with the National Environmental Protection Act (NEPA)" we find that compliance with Section 106 requirements under NEPA is lacking on several key points:

- The EA/OEA involved only two other consulting parties, the U.S. Air Force and the Federal Aviation Administration (FAA). There is no mention in this document as to consultation with or by the Commonwealth of the Northern Mariana Island (CNMI), nor more importantly, with or by its public. Holding public meetings over the course of one or two evenings for a two to three hour period does not constitute consultation.

- The National Environmental Policy Act (NEPA) and the regulation of the Council on Environmental Quality (CEQ) requires that agencies consider the effects of their actions on the HUMAN ENVIRONMENT in all its aspects, including its cultural qualities. With respect to its proposed undertaking and prior "approved" activities on FDM, the U.S. Navy has chosen to disregard this requirement by "not pursuing further analysis of Geology, Soils, Water Quality, Air Quality, Fish, Marine Mammals, Sea Turtles, Seabirds, Terrestrial Species and Habitats, Socioeconomics, Cultural Resources, and Environmental Justice."

- Pursuant to Section 800.4 through 800.5 of Section 106 Review under the National Historic Preservation Act (NHPA), "the agency has to identify historic properties and assess the effects" that the undertaking has on said properties in a manner commensurate with the assessment of environmental factors.

- Moreover, Executive Order 12898 requires that agencies pay special attention to disproportionate and adverse environmental impacts on low income and minority populations; such impacts may be cultural in nature. The native Chamorro and Carolinian

communities of the Northern Mariana Islands appear on numerous federal reports as "low income, underserved, minority groups" and in its FONSI/FONSH, it is clear that the U.S. Navy did not address any such disproportionate and adverse environmental impacts on the Chamorro and Carolinian communities of the Northern Mariana Islands who have called the Marianas Archipelago their island home for millennia and for whom the islands and the ocean that connects them are one and the same and not distinct nor disparate entities.

From a compliance standpoint, we find that the EA/OEA FONSI/FONSH is not only inaccurate, but negligent in its exclusivity with regard to the adverse impact that past military activity has had on FDM and its immediate and surrounding environs, and under which the current proposed MIRC Airspace Modification anticipates to do the same.

The many effects of the continued bombing on FDM, for example, cause erosion. Bombing decimates vegetation, thereby exposing the soil, which in turn end up in near shore waters as a result of runoff. Additionally, any chemicals in the bombs themselves end up in the nearshore waters, either directly or indirectly by leaching into the ground.

"The nearshore is defined as an indefinite zone extending seaward from the shoreline well beyond the breaker zone. It defines the area where the current system is caused primarily by wave action." Nearshore waters "provide a unique habitat for a variety of plants and animals. Sea grasses and other aquatic plants living in the nearshore waters provide food and shelter for many species of fish and shellfish. Many marine organisms, including most commercially valuable fish species, depend on nearshore waters at some point during their development." [1]

"*Sediment* and other suspended solids can wash off when it rains. As these sediments enter coastal waters, fish respiration is impaired, plant productivity and water depth are reduced, aquatic organisms and their habitats are smothered, and the aesthetic enjoyment of the water is diminished." "*Toxic substances*, such as metals (e.g., mercury and lead) and toxic organic chemicals (e.g., PCBs and dioxin), which may originate from" bombing the island, "can severely disrupt the nearshore waters habitat. These toxic substances can cause death or reproductive failure in the fish, shellfish, and wildlife that use the habitat. In addition, they can accumulate in animal and fish tissue (leading to fish consumption advisories), become attached to sediments, posing long-term health risks to humans." [1]

"*Habitat modification* results from activities like development, channelization, dam construction, impacts from storms, and dredging," and bombing the island. Typical examples of the effects of habitat modification include loss of vegetation, siltation, smothering of bottom-dwelling organisms, and increased water temperatures. The modification of surrounding lands causes water quality problems that can decrease the number of species capable of living and reproducing in the nearshore waters." [1]

Current bombing and the proposed increased bombing activities at FDM WILL HAVE A SIGNIFICANT IMPACT on near shore water habitat.

At the scoping meeting held on Saipan at the Multipurpose Building on November 13, 2013, we asked if there were any baseline testing of near shore waters at FDM, and we were told "no". And that water sampling of near shore waters had not been conducted in the past. It would appear that monitoring of near shore waters has never been done. Therefore, the statement of No Significant Impact is not accurate. Until data is provided, one cannot and must not assume that there will be No Significant Impact.

Section 802 of the Covenant to Establish a Commonwealth of the Northern Mariana Islands in Political Union with the United States of America states in part and relative to the lease on FDM:

> (a) The following property will be made available to the Government of the United States by lease to enable it to carry out its defense responsibilities:
> (b) (3) on Farallon de Medinilla Island, approximately 206 acres (83 hectares) encompassing the entire island, and the waters immediately adjacent thereto.
>
> Section 803.
>
> (a) The Government of the Northern Mariana Islands will lease the property described in Subsection 802(a) to the Government of the United States for a term of fifty years, and the Government of the United States will have the option of renewing this lease for all or part of such property for an additional term of fifty years if it so desires at the end of the first term.
> (b) The Government of the United States will pay to the Government of the Northern Mariana Islands in full settlement of this lease, including the second fifty year term of the lease if extended under the renewal option, the total sum of $19,520,600, determined as follows:
>
> (1) for that property on Tinian Island, $17.5 million;
> (2) for that property at Tanapag Harbor on Saipan Island, $2 million; and
> **(3) for that property known as Farallon de Medinilla, $20,600. The sum stated in this Subsection will be adjusted by a percentage which will be the same as the percentage change in the United States Department of Commerce composite price index from the date of signing the Covenant.**

To the best of our understanding, your report states that there is no significant impact on the island of FDM with your proposed expansion of the danger zone; in other words, increased bombs, mortars, missiles and toxins dropped on FDM are without further annihilation of the island or the people of the Northern Mariana Islands. By our sense of logic, we find this very difficult to assimilate or even understand. We request, therefore, that the U.S. military, specifically the Navy, conduct a new environmental and socio-economic evaluation so that a proper appraisal of FDM could be made available. This reassessment has been long overdue. We also feel that to indicate that our beautiful FDM was "uninhabited" or is "uninhabitable" and that a mere $20,600.00 to lease it for "purposes" not detrimental to its environs (and to those of her sister islands to its north and south), is not only grossly inaccurate, but expressly and unconscionably negligent.

FDM has the largest reef mass in all of Micronesia. FDM is a very special place for NMI fishermen because of its proximity to Saipan, additionally; the depth of its reef mass is rich in mafuti (emperor)

and atulai (big eye scad), for example. Mafuti and atulai are readily recognized and very much loved by the people of the Marianas most especially during the season of Lent.

Moreover, there are three sea mounds immediately north of FDM where fishermen have had and should continue to have the greatest potential for harvest. Expanding the danger zone clearly has a significant impact on the livelihood of our fishermen which in turn will decrease their catch affecting our local market by lowering the availability of fish for purchase and ultimately increasing the price of fish. In the end, our diet will be affected because these increased prices on local fisheries will force our local community to purchase cheaper foods such as canned foods which have been scientifically proven to be an unhealthy diet.

The Avifauna of Farallon de Medinilla, Mariana Islands (La Avifauna del Farallón Medinilla, Islas Marianas), Michael R. Lusk, Phillip Bruner and Curt Kessler, Journal of Field Ornithology Vol. 71, No. 1 (Winter, 2000), pp. 22-33, discusses the impacts of military training on FDM:

> **FDM's vegetation appears to have undergone significant changes since the island has been used as an impact area for military training. At the height of the Vietnam era, as much as 22 tons of ordnance per month were delivered to the island (USDN 1975). Over a three year period that began in May 1988, ordnance delivered to the island includes up to: (1) 5 to 612 live/inert bombs per month from bombers, (2) 920 missiles and 1,825 kg of bombs annually from fighter aircraft, (3) 1,440 rounds from naval gunfire annually, and (4) 50,600 rounds of small caliber ammunition and 2,600 grenade rounds annually (USFWS 1998a). The potential for this level of military training to alter drastically the vegetation of FDM was apparent in August 1997 when post-bombardment surveys of FDM revealed 45-50 fresh bomb craters and a large section of the island burned to bare earth (USFWS 1998A). It is likely that this type of damage is representative of vegetative change that can occur during military training and demonstrates its potential to alter the vegetative structure of FDM from one of a medium-height, relatively closed canopy forest, to one dominated by open areas with intermittent patches of low forest.**
>
> **Despite continuing impacts from military training, FDM remains a valuable seabird nesting resource in the Marianas and deserves protection. It is particularly valuable because it possesses important breeding populations of Masked Boobies and Great Frigatebirds. In order to properly assess the impacts of military training on resident land and seabirds, we recommend that the Navy permit frequent, on-the-ground surveys by qualified biologists. This is the only method by which changes in densities, distribution, and species composition can be adequately monitored over time. Studies of nest success on**

FDM compared to other islands would also help to determine affects of military training on resident seabirds.

Although the Migratory Bird Treaty Act regulations were amended in 2007 to allow for the incidental taking of migratory birds during military readiness activities (50 C.F.R. §21.15), it is worth mentioning that impacts on FDM as mentioned above are significant to the health of our land in relation to its resident birds and its surrounding waters. Furthermore, we are not asking to cease current military practices, rather, to simply stay the course and not pursue the proposed increase of the danger zone.

The Commonwealth of the Northern Mariana Islands is a fishing community.

The legal concept of a fishing community comes from the Magnuson Fishery Conservation and Management Act, reauthorized in 1996 and amended by enactment of the Sustainable Fisheries Act (SFA), which also renamed it the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA requires Fishery Management Councils to amend existing fishery management plans and, among other things, pay more attention to human fishing communities.
MSA National Standard 8 (NS8) specifies that:

> **Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and the rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities (MSA Section 301(a)(8)).**

The amendments also defined fishing community:

> **The term "fishing community" means a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community. (MSA Section 3(16))**

The National Standard Guidelines (50 CFR 600.345(b)(3)) provided additional definition of fishing communities:

> **A fishing community is a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing**

or on directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops).

In response to the mandate of MSA to identify and describe fishing communities, the Western Pacific Regional Fishery Management Council (Council) proposed that each of the major island areas (Hawaii, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands) be identified as a fishing community, because

In contrast to most U.S. mainland residents, who have little contact with the marine environment, a large proportion of the people living in the western pacific region observe and interact daily with the ocean for food, income and recreation...fishing also continues to contribute to the cultural integrity and social cohesion of island communities...In each island area within the region the residential distribution of individuals who are substantially dependent on or substantially engaged in the harvest or processing of fishery resources approximates the total population distribution. These individuals are not set apart...from island populations as a whole (September 1998, p. 52-53).

On April 19, 1999, the National Marine Fisheries Service (NMFS) approved identification of American Samoa, the Northern Mariana Islands, and Guam as fishing communities (64 FR 19067).

FDM is rich in fisheries for our people. Please allow us more access to our birthrights at our FDM. The waters surrounding our islands have been recently returned to us, rightfully. On September 18, 2013, 48 U.S.C. § 1705 was amended and now reads, in part:

Subject to valid existing rights, all right, title, and interest of the United States in lands permanently or periodically covered by tidal waters up to but not above the line of mean high tide and seaward to a line three geographical miles distant from the coastlines of the territories of Guam, the Commonwealth of the Northern Mariana Islands, the Virgin Islands, and American Samoa, as heretofore or hereafter modified by accretion, erosion, and reliction, and in artificially made, filled in, or reclaimed lands which were formerly permanently or periodically covered by tidal waters, are hereby conveyed to the governments of Guam, the Commonwealth of the Northern Mariana Islands, the Virgin Islands, and American Samoa, as the case may be, to be administered in trust for the benefit of the people thereof.

Prior to September 18, 2013, we did not have our submerged lands. The U.S. government has finally recognized that we have been neglected for many decades past and has begun remedies by

enacting U.S. Public Law 113-34. We are asking that the Navy do the same. Please respond favorably to our requests:

1. Adopt the No Alternative;
2. Allow our fishermen more time to harvest from the rich waters of FDM;
3. Conduct a complete reassessment of the impacts on FDM thus far; and
4. Allow for on-site studies of our wildlife on FDM by non-military personnel.

Should you still find it necessary to pursue Alternative1 or Alternative2, we strongly suggest renegotiating the technical agreement executed on January 6, 1983 by and between the Commonwealth of the Northern Mariana Islands and the United States of America.

We are undoubtedly part of the fabric of our nation's security and we share those same concerns as any other citizen within the 50 states. However, what sets us apart from the rest of the nation is the fact that we are a small chain of islands living off of our lands and waters. FDM has been, and always will be, an important and living component of our NATIVE MARITIME HERITAGE.

Thank you for your time and meaningful consideration of our submission.

Respectfully,

Keli A. Tenorio
President
Guatdia'a Gani
Guardians of Gani

REFERENCES

[1] Coastal Watershed Factsheets - Nearshore Waters and Your Coastal Watershed http://water.epa.gov/type/oceb/fact3.cfm

Michael R. Lusk, Phillip Bruner and Curt Kessler
2000. The Avifauna of Farallon de Medinilla, Mariana Islands (La Avifauna del Farallón Medinilla, Islas Marianas), , Journal of Field Ornithology Vol. 71, No. 1 (Winter), pp. 22-33.

Allen, S. D., and J. R. Amesbury.
2012. Commonwealth of the Northern Mariana Islands as a fishing community. U.S. Dep. Commer., NOAA Tech. Memo.,NOAA-TM-NMFS-36, 89 p.

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3) Completing the online comment form at **www.MITT-EIS.com**.

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: As a Civilian, I am neither for nor against the Military in General. However, if the trainings and testing is sure to not harm, both marine land and human life then I will give my support.

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Name: [redacted]

Organization/Affiliation:

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments:

The commenting & public hearing process was not very open or accessible. The website was not very user friendly also. In regards to marine life, threatened speeics should also be in consideration of monitoring & study. We should not wait til they are endangered to protect them. Training should not happen at the expense of important cultural resources.

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: NO ACTION ~~BY~~ ALTERNATIVE :

Because many of these military ordinances are still presently around the Marianas today, there is no telling that daring training & military excercise, some of these explosive materials might be around for many years with in our lands & sea. who knows, some may be carrying poisonous & radioactive elements.

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Name: [redacted]

Organization/Affiliation: _____

Address:* _____

City, State, Zip Code: _____

Comments: I believe the training activities currently taking place on island are already a threat to the people and environment. Our island is considered sacred among the natives and it would be great for visitors, and people not local to the place, to grasp this. However, training activities may continue to happen. We are thankful to the military for what they have and are doing to improve and protect us. We are not resentful towards the military's actions. We just want a little acknowledgement and respect towards our culture and beliefs. Being a small island located in the pacific, we have a lot of issues to worry about already, mostly dealing with the environment

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:*

City, State, Zip Code:

Comments: "I do not support the proposed Mariana Islands Training & Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training & testing activities pose severe threats to our Islands."

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Name: [redacted]

Organization/Affiliation:

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: I do not support the actions of the U.S. military using any Mariana Island for aggresive and violent training. Thank you for educating the local people on their brother/sister islands.

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Name: [redacted]

Organization/Affiliation:

Address: [redacted]

City, State, Zip Code: [redacted]

Comments:

People need to see more beauty to appreciate the beaty and resources that these islands contain. Military has bit off more than it can chew

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Name: [redacted]

Organization/Affiliation: [redacted]

Address: [redacted]

City, State, Zip Code: [redacted]

Comments: I propose that the MITT activities implement a 'NO Action Alternative'. In such, this recommendation does not mean that I support the on going activities already occurring in the Marianas Islands. Such Training Activities and Testing poses an extreme threat to our islands, people and our Marine & land resources.

STOP Militarization IN the Marianas Islands!!!

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: I do not support the proposed MITT activites. I recommend the NO Action Alternative. However, my recommendation of this alternative does not mean I support the ongoing training activites already occuring in the Marana Islands. The Navy's training & testing activites pose severe threats to our islands.

I am against the destruction of my islands & the negative impacts it has on our marine life.

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Name: [redacted]

Organization/Affiliation:

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: the testing that is about to happen on our island is not safe for the environment. even though they say it won't harm the environment, the training they do will affect the wildlife that's been living in the area. Also it's an ancestry ground. we keep our island as beautiful as it can get. The training will just alter some of the species' living habit.

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* _____

City, State, Zip Code: _____

Comments: _____

Est 2000 is a possible alternative

- theres only so much land that can be taken before there is nothing left

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Name: _____

Organization/Affiliation: _____

Address:* _____

City, State, Zip Code: _____

Comments: I do not support the proposed Mariana Islands Training and Testing activities. I recommend the "No Action Alternative." However, my recommendation of this alternative does not mean I support the ongoing training activities already occuring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands

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Anonymous Anonymous	Submitted via Website	DO NOT BOMB FDM! DO NOT INCREASE TRAINING IN THE MARIANA ISLANDS. OKINAWAN CITIZENS HAVE PROTESTED AN INCREASED MILITARY PRESENCE AND SO ARE THE PEOPLE OF THE MARIANAS. THERE HAS BEEN WIDESPREAD DISSATISFACTION WITH THE MILITARY IN THE MARIANAS AND THIS REACTION SHOULD BE TAKEN SERIOUSLY BY THE U.S. MILITARY. AN INCREASED PRESENCE WILL NOT PRODUCE LONG-TERM ECONOMIC EQUALITY THROUGHOUT THE MARIANAS AND WILL ONLY SERVE TO INCREASE THE CNMI GOVERNMENT'S DEPENDENCE ON THE MILITARY. THERE IS NO AMOUNT OF MONEY THAT THE MILITARY CLAIMS IT WILL BRING TO THE ISLANDS THAT WILL REVERSE THE NEGATIVE IMPACTS THAT THE USE OF WEAPONS WILL HAVE ON THE LAND AND THE PEOPLE OF THE MARIANAS.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [X] YES

Name: [redacted]

Organization/Affiliation: _____

Address:* _____

City, State, Zip Code: _____

Comments: There are good things and bad things to the testing. The good things are at least they do have a place to test on and find out the effects. It is also okay since they do notify people and make it safe. However it is bad because our islands are sacred and we should aim to protect it. This is harmful with the radiation and harmful to the animals around it. I think they should stop the testing and find a new way to test

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You may submit your comments by:
1) Depositing this form in the comment envelope before you leave tonight
2) Mailing this form to:

Naval Facilities Engineering Command Pacific
Attention: MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

3) Completing the online comment form at **www.MITT-EIS.com**.

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [√] YES

Name: [redacted]

Organization/Affiliation: _____

Address:* _____

City, State, Zip Code: _____

Comments: I think that it is good that they have a place to test bombs and their other services. but there are consequences. Although they do warn fishermen, they are still harming the sea animals with that. they should be careful. In the room, they did say that they are expanding their area but that also means they are expanding the harm towards sea animals.

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Draft EIS/OEIS Comment Form

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Name: _____

Organization/Affiliation: _____

Address:* _____

City, State, Zip Code: _____

Comments: I feel that you are gradually setting up the destruction of the mariana islands with your trainings and testings. As I continued down the line of posters, your justification for your action showed to be hollow. They did not give me the assurance of "safety" that was constantly stressed. Most of your reasons were vague and lacked a clear description & benefit of how your actions could affect us positively. This is our island! Please respect it.

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Name: _____

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: The formal open-house event for the EIS is nice, but an actual conference where interested individuals can listen on to speakers about the various components in the EIS and ask questions would be best for this purpose. Allows everyone to share and gain more detailed information for those that do not have time to read the entire EIS.

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Name: _____

Organization/Affiliation: _____

Address:* _____

City, State, Zip Code: _____

Comments: I choose the no action Alternative, fishing in the NMC Islands has been a way of life for my family, & thus we have seen drastic changes in the population of wild life in our ocean, I do not support the training currently taking place. I believe the live ammunition in this area disturbs the ~~deep~~ matured fishes habbits scaring them & preventing them from spawning in shore.

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code [redacted]

Comments: In sum, the Mariana Islands training & testing of the use of vessels, sonar, & explosives will indeed take impact on the marine habitat, marine birds, vegetation, invertebrates, fish, & cultural resources. It does not say this whether the tests affect a small or big fraction. It still does say that these species will be harmed during the duration of this period.

Sonar waves can be compared with a faulty sound wave. Just imagine experiencing excruciating sound waves on a daily basis. It is like [redacted] giving permission for our dolphins & whales to suffer all for the sake of surveying & "protecting" this island that is not being threatened in the waters.

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: Stop supporting the destruction of marine life and land life. Please stop telling the public that the benefits outweigh the consequences. If you are going to destroy our island for military purposes, at least be honest about it. Although the military might think your reasons to bomb and attack the Mariana Islands are valid, the people of Guam do not. The military does not have the consent of Guamanians to destroy our island. Also, the ends do not justify the means.

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Name: _____

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: I do not support the sonar training. It may benefit the U.S., but there are no benefits for our ocean lives. You may turn the waves off when you see oncoming creatures but that is not 100% guaranteed. There are many undiscovered sea creatures in the Mariana Islands, so I do not support sonar training.

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Name: _____

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: I do not fully agree with the bombing on the marana islands. even though it may benefit the military ~~[illegible]~~ they are destroying what is left of the marana islands. I also disapprove because it harms the animals and enviroment.

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: The sonar presentation did not deny the fact that the sonar was a contribution to the death of whales. Although the sonar is a way to defend their navy sailors from warfare, it still has negative effects on the natural habitats. The whole MITT presentation is a bit overwhelming for those who want to keep the islands safe. It is a sensitive case for islanders because it is our home and we should not be marginalized. I agree, however that it is for the overall protection for the island.

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: Although these environmental impact statements lists down ideas of the good it may contribute for the military, I feel as though some of these factors have been a threat to the Mariana Islands in terms of their use in the technologies produced. I am aware that the intentions of these trainings are for preparation for the worst, but are they really that valuable to sacrifice our natural habitat & without the consent of the people of Guam! Hear our voice!

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: I wasn't able to go through all the booths, but I was able to go to 2. I went to one about sonar and FDM I mentioned radar and how it contributes to the death of whales. She went on with how it's not the only contributing source and she does deeply care of them. Her stance was that its for our defense, our protection. Sonar is used to detect mine. I thought this was really interesting. I knew they kept away enemy ships but wasn't aware of its lookout for bombs and mines. I really dislike the bombing of outer islands. However because our safety is also important. I can't be against it. We need to train in order to be safe. I understand the ~~Guamas~~ people of Guam's point of view, but I wish they provided more compelling evidences ~~instead~~ so the people

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Name: [redacted]

Organization/Affiliation: [redacted]

Address:* [redacted]

City, State, Zip Code: [redacted]

Comments: I do not support the proposed Mariana Islands Training and Testing Activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occuring in the Marianas. The Navy's training and testing activities pose severe threats to our islands and its people.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

A A	Submitted via Website	The proposed bolstering of military planning and activities throughout the Mariana Islands will not doubt have tremendously negative impacts on the physical environment in the region, as well as on social, cultural and political arenas. As a citizen of the CNMI, I simply do not support any and all actions that the military has always had, and continues to have in this area. The islands are essentially being used by the U.S. military and government as the expense of the lives of those in the Marianas, all in the name of a convoluted notion of "security," that misleads the American public into believing it is truly becoming a safer nation. All the while, the people who have always suffered and continue to suffer form this belief, are the people of the Marianas who's lands need to be bombed and trained on in order to maintain the "security" of mainland America. This growing militarism must stop now.
P. A	Submitted via Website	Is it really necessary? How will doing this benefit us in any way? All of this just entails destruction. Destruction to land and all of its inhabitants. More thought and research should be done about how this would affect the wildlife. It affects people too! We care about our islands. It takes billions of years for one island to emerge and to destroy it doesn't make sense at all. Then it becomes a home to many species of all animals and plants. It only makes the matters worse for this to affect species of the land and sea! It's slaughter! Are we trying to lead these creatures into extinction? Our environment is everything and we should only treat it with the utmost respect. While recycling is being strongly encouraged to save the environment of an island, another island is being bombed and destroyed. Something needs to change! Changes in the environment affects all creatures! It is like a domino effect. It may not be soon but in the long run. This madness needs to stop.
Y. Acfalle	Submitted via Website	I have a BIG feeling that the department of defence has planned this all along. If we go way back in history, it is evident to see that they're trying to take over our islands as their training site-- it is even evident today. If you compare our islands to other islands such as the Federated States of Micronesia, Hawaii, Puerto Rico, they all have bases but they don't take up most of their islands. They still speak their native language even though they are part of the US. That's the sad thing, we are an UNINCORPORATED territory of the US. They are trying to get rid of us, they are trying to push us out of our islands. I feel they chose our islands because of our Marianas Trench. --This is why they had that rule of absolutely NO speaking our native language in schools back then (to weaken our culture). --This is why whenever a person from here goes to the states, they (a US citizen) say they're not allowed to speak of our citizenship or they don't accept our ID's. --This is why I want to fight it. This isn't right! Us Chamorus have to end this now before it's too late. We need to spread the word! We need to take action NOW because right now, the way I see it, in probably 50 years or less, our islands will be 100% military bases. #SMH

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

R. Ady	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. It puts our sacred and takes away our land.the land of the people
L. Aguilera	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
M. Aguon	Submitted via Website	I am against the DOD proposal to use the Northern Mariana Islands as a training and bombing site. This area MUST be preserved and NOT used for the proposed destructive training.

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

T. Ahana	Submitted via Website	Me and my constituents here at the University of Washington do not support the US military occupation of any islands in the Pacific. Please stop the occupation!
T. Akerele	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
S. Alberts	Submitted via Website	It is wrong to take peoples land. This land is sacred, and it does not belong to the US! Stop colonization, and gentrification, and exploitation of these people, and of all people. This is threatening something beautiful, and important.
D. Alcantara-Camacho	Submitted via Website	I oppose the current training and testing in the Marianas and select the No Action Alternative. We don't need no war. We need Love a whole lot more.

R. Alexander	Submitted via Website	I understand that from a military point of view, a training area in this region might be necessary, although personally I believe that the ocean should be used for peaceful purposes only. With regard to the EIS, however, I have several concerns. 1. Although the EIS process itself allows community participation, the people of Guam, in spite of being US citizens, are not able to participate in the formulation of US military policy itself, because, for example, they cannot vote for president or have a voting say in Congress. It seems to me that until the people of Guam can participate from the begining in policy formulation, aggressive plans such as this have no place here. 2. Sonar has been proven to adversely affect hearing and perhaps other functions in dolphins and whales. There are also possibilities that it will affect other sea life. The EIS itself states that it will permanently affect hearing in whales and dolphins. If this is known in advance, then according to the precautionary princile, it seems that until this problem is solved sonar training should not be conducted in the area. 3. The proposed training area contains vasts areas of ocean, islands, and air. We know that in recent years, global warming and atmospheric changes have brought a serious of disasters of unimaginable proportions. What guarantees are in place to ensure that extensive sonar use and underwater explosions will not affect the geo-thermic balance and/or the ability of sea life to sense and protect themselves from changes in their environment? Are there guarantees to protect the ocean, sea life, and surrounding island communities in the event of such a disaster during training exercises?

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Name: Alyssa Affiola

Organization/Affiliation: AOLG

Address:* POBOX 3331 ~~Hagatna Gu.~~

City, State, Zip Code: Hagatna Gu 96932

Comments: It was good to learn more about what the US is trying to do and how in some ways it could play a role in our protection since we are a US territory. However, I was questionable if they knew the harmful effects that could happen to surrounding islands, such as Guam. I did learn that they advise fisherman before they start testing, which I thought was very considerate, but I also wish they could reconsider the harmful effects that could happen. I'm stuck in between & could only hope for the best for our island.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

K. Asuncion	Submitted via Website	I think that these training and test should be contained to the Islands of the Mariana's that are already being used for trainings, the islands that are uninhabited. Why are is the military trying to take more lands? There is more than enough lands for real life trainings in the islands that are already being used!
M. Atoigue	Submitted via Website	Why doesn't the United States just give us our Constitutional Rights?
M. Atoigue	Submitted via Website	Why does the United States have to use our Islands for testing? Aren't there plenty of unused lands in the United States that can be test on?

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Name: Gabrielle Avilla

Organization/Affiliation: Academy of Our Lady of Guam

Address:*

City, State, Zip Code:

Comments: I spoke to the speaker who is a part of the Coast Guard, who practices the transmission of awareness and information to the island of Tinian. He spoke about how the Navy and Coast Guard practice the safety of warning the people of the island when they are prepared to release bombs and any release of materials dropped by the military. I believe that the speaker enlightened me about the whole idea of awareness and protection of people. Even if the profession of awareness is provided, the effects still will conquer the life on the island of the inhabitants.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

L. Axelrod	Submitted via Website	I write this as a lawyer who practiced environmental law. There is no environmental mitigation that can make up for the injuries and death this "training" has inflicted and will in the future. This project is an environmental disaster without proportionate redeeming value. It's the ultimate hubris to destroy innocent life by bombing the hell out of this area in the name of preserving life. Has the military learned nothing about species being pushed further and further into small pockets of survival and about the injuries inflicted by sonar? Or, at the most 'practical' level, about the benefits flora and fauna wildlife provide humans by way of medicine, etc.? This is a form of destroying a village to save it, writ large. The lessons of Vietnam have been forgotten if, in this age of declining natural resources and species going extinct from various forces, including climate change, the military thinks that eradicating a rich area of species population can do anything but contribute to killing off human life since we're dependent on the chain of life, not outside it. Kill this program, please.
V. Balajadia	Submitted via Website	To whom it may concern: I am commenting on your proposals concerning our "beloved" island home "the Mariana Islands"and surrounding ocean-the blue pacific! I strongly believe that the outcome of your proposal will destroy our environment and our care of the earth and our future as an island nation. I urge you to listen to our island leaders and indigenous people's concerns in your deliberations as you move forward with your plans. KUDOS and blessings to Julian Aguon and those working to preserve our "small" island! Thank you , Sister Vincent Marie Balajadia
V. Balajadia	Submitted via Website	To whom it may concern: I am commenting on your proposals concerning our "beloved" island home "the Mariana Islands"and surrounding ocean-the blue pacific! I strongly believe that the outcome of your proposal will destroy our environment and our care of the earth and our future as an island nation. I urge you to listen to our island leaders and indigenous people's concerns in your deliberations as you move forward with your plans. KUDOS and blessings to Julian Aguon and those working to preserve our "small" island! Thank you , Sister Vincent Marie Balajadia

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

C. Barretto	Submitted via Website	The People of Guam appreciate the freedom we live under, but in this day and age I am not sure that the price we have to pay if it's worth it. imagine these facts below: 1.The MIRC is the largest DOD range in the world. It spans 501,873 nautical miles of ocean and is 3 times larger than California. 2.The MIRC also includes 70,000 nautical miles of airspace for training. This is the size of the state of Washington. 3.The MITT would nearly double the ocean covered under the MIRC, expanding the range of DOD training to 984,469 square nautical miles. The MITT would be larger than the states of Washington, Oregon, California, Idaho, Nevada, Arizona, Montana, and New Mexico combined. 4.Under the MIRC/MITT, DOD will bomb Farallon de Medinilla, blow up mines under water and perform sonar training. 5.The use of sonar training will result in permanent hearing loss for up to 59 whales and dolphins per year. (MITT, Vol. 1, p. 3.4-114) This will kill off our natural resources and environment and will have a large impact on our island community and the rest of the world.
J. Bartlett (Main Street Moms)	Submitted via Website	The U.S. Military plans to occupy ALL of Pagan Island for live- fire training and military exercises, ignoring the indigenous rights of Pagan Islanders, and the devastating environmental impacts that such activity will certainly cause. Please do not let this happen to such a precious biological treasure
T. Benavente	Submitted via Website	Leave our Island and waters alone, Guam is our home.
P. Blair	Submitted via Website	No to the Navy conducting live rounds training in the Mariana's Pagan Island. Clean up of one of the Hawaiian Islands used for such training is not complete. Navy nuclear testing in the Marshall Islands without ESA continues to cause long standing environment and human health problems for the Marshallese.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Michelle Bass

Organization/Affiliation: UOG

Address:* Mangilao

City, State, Zip Code: 96923

Comments: I do not support the proposed Mariana Islands Training & Testing actions. I support the No Action Alternative. It is obvious that using that area for these actions pose severe threats to our islands, and beyond that it is selfish.

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Written Comment(s) on MITT Draft Environmental Impact Statement
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M. Blas	Submitted via Website	Permanent hearing loss of 59 dolphins and whales???? That's just like murdering them! Hearing is their most important sense and without it, they have little chance of surviving. Their echolocation is how they survive and how they escape predators... Is this really necessary? Does it have to be done here? And can it be tested in a laboratory and not in our waters killing real animals? In this day and age, simulations are very realistic and would result in NO animals killed... This past year, we have seen one giant dead sperm whale wash up on Guam's waters and one dolphin. It was very sad to see this, but with your proposed MITT site, we will see 59 of these a year? That's deplorable. What happened to the Marine Mammal Protection Act? And what happened to the Marianas Trench marine National Monument that President George Bush created? I'm truly disgusted by this decision to practice active sonar in the Marianas and by the lack of concern for our fellow mammals and these beautiful creatures that have been on this earth millions of years longer than we have, yet we humans (our US Navy mostly) are so insensitive and horrible to them...
M. Blas	Submitted via Website	Protection of Wildlife and Habitat??? How can you say that you are doing ANY of this if you are going to be dropping bombs in our waters? Our fish live in these waters. Our turtles live in these waters. Turtles that are federally protected in the USA... Our whales and dolphins live in these waters... Our food live in these waters. We only have ONE ocean... with many parts near many different countries... By bombing in OUR backyard, you are poisoning our waters, OUR food, OUR people... There has got to be another way... There just has to be... And with technology and our ingenuity... We need to find those ways... If you REALLY want to PROTECT WILDLIFE AND HABITAT.. If you REALLY want to PROTECT OUR CULTURAL RESOURCES AND HISTORIC PROPERTIES... Unless it's just talk and you are just saying those words to pretend you do...

Written Comment(s) on MITT Draft Environmental Impact Statement
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M. Blas	Submitted via Website	Here's what I want to know... When our Navy is out there bombing and testing bombs on the whales and dolphins' homes, who is out there checking to make sure that they are ceasing their activity "until the animal exits the zone"? So they will just be patrolling and policing themselves... We will just have to take "their word" that they are honoring the marine Mammal protection act and the Endangered Species Act? I hardly qualify that as "The Navy protects marine species and reduces its effects on the marine environment when training and testing at sea." It's like saying you don't need principals at a school because we just trust that the students will do what is right... And like saying that the police are not necessary because everyone is going to do what they are supposed to do... And how can you say that they are reducing the effects on the marine environment? You are BOMBING THEIR HOME!!! You are bombing our food source! You are bombing and putting tons of chemicals into the water that we swim in, the water that we fish from, the water that we invite tourists to visit and stimulate our economy. THE OCEAN IS THEIR HOME!! THE OCEAN IS OUR FOOD SOURCE!! IT WILL GREATLY IMPACT AND HARM US FOR YOU TO BE BOMBING IN AN AREA THREE TIMES THE SIZE OF CALIFORNIA! THIS IS UNACCEPTABLE AND JUST PLAIN WRONG! Please do something REAL to protect our Marine animals.. Here's a suggestion: DON'T BOMB OUR OCEAN. DON'T PLAY WITH BOMBS FOR PRACTICE. DON'T KILL OUR ANIMALS. DON'T POISON OUR PEOPLE. FIND ANOTHER WAY. IF YOU REALLY WANT TO PROTECT MARINE SPECIES.. IF YOU REALLY WANT TO REDUCE THE EFFECT ON THE MARINE ENVIRONMENT.
J. Blume	Submitted via Website	The USA has done enough harm in Guam. It is home to great natural beauty and magnificent creatures, a number of whom are endangered.

Written Comment(s) on MITT Draft Environmental Impact Statement
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J. Borja (Electronic)	I do not support the Mariana Islands Training and Testing. The Chamorro people have suffered enough. Our island has very little cultural insignias that remain in tact and not destroyed by people. These islands above Guam May be nearly impossible to occupy, but it is still sacred land. In Guam we have almost no wildlife, birds killed by snakes brought to the island by ships. Insects, rodents, and disease have become normal to our once sacred land. Much like the Native Americans we lived off the land, prayed to spirit, honored our surroundings, respected what and who came before. We didn't have a say when they suppressed our language and culture hundreds of years ago, now we do. Please do not destroy our sacred lands. One day when land shifts beyond human control it may one day become home to many Chamorros. Our reefs of Guam almost extinct still suffering and diminishing slowly yet surely. It is time to stand against destroying and stand for preserving Mother Natures beautiful bounty. Our islands are not up for grabs. Let our land be free from western development and high profit gaining, power struggle, and the need to control all beings on earth, including animals and plants. Stop destroying the earth
G. Borrini-Feyerabend (Electronic)	Unique biodiversity on the scale of the foreseen range in the Mariana Islands should NOT be destoyed or kept hostage to military exercises. Doing so would be nothing short of an environmental crime.
H. Bowen (Electronic)	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats the wellbeing of the people and animals that live there. Why continue seeing the people of these islands and their lands as expendable? The expansion would be irresponsible and very detrimental.
E. Bowman (Electronic)	I am opposed to the Department of Defense's plans for the Marianas Islands Range Complex (MIRC) and the Marianas Islands Training and Testing (MITT). In light of the calamity that occurred in the Marshalls and the continuing threats to Pagat and the entire Marianas as well as this region, it is time to step back and rethink an increase in destruction of the irreplaceable natural environment. I stand with the people of Guam and the CNMI who do not support increased destructive foreign military presence here.
C. Brands (Electronic)	I request that you NOT allow the bombing and otherwise destructive "training" exercises on the Mariana Islands. There are valuable and diverse, terrestrial and marine animals and fragile ecosystems, that, if destroyed, will never recover. Do Not allow the bombing of the Mairana Islands.
B. Bukikosa (Simon Sanchez High School) (Electronic)	Instead of using live ammunition, use blanks. Also cut down the amount of training days and exercises to prevent a large amount of marine life casualties. Or concentrate training site in a less inhabited area

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: M.C.

Organization/Affiliation:

Address:*

City, State, Zip Code: Guam

Comments: This question was asked to a six-year old
What do you like about Guam? How would you try to keep it?
I want to protect my family. I would like families to give
canfood to the Philippines. Guam. I think about the
flowers. I care about the animals

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Name: Herman Cabrera

Organization/Affiliation: Resident of Saipan

Address:* P.O. Box 501421

City, State, Zip Code: Saipan MP 96950

Comments: See attached

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Mariana Islands
Training and Testing EIS/OEIS
Public Meeting
Speaker Request Card

Name: Herman B. Cabrera

Organization/Constituency Represented (if any): _____

Supplied written & spoken comment

Date: 11.13.13

My name is Herman B. Cabrera and I am a resident of Saipan. I am in opposed to the proposed military firing and bombing activities on and underwater of the Commonwealth of the Northern Mariana Islands (CNMI).

Let me start by saying that our ancestors survived for centuries here in the Mariana Islands and lived to tell their children the tale of our natural healthy ocean environment and the abundance of marine recourses in the ocean that they used as their main food source. The vast blue water of this part of the Pacific Ocean still has lots of different kind of marine life living in it particularly those around our islands in the CNMI from Rota, the island on the south end of the CNMI, to Farallon De Pajaros, the northern end of the CNMI. Fish was and still is part of our healthy natural diet. Therefore, besides land, the ocean is the only other lively hood we have from the beginning to the present.

After World War II, the military left us with military junk such as unexploded ordinance, filled and empty oil (as well as tar, petroleum and other type of fuel) drums, Polychlorinated biphenyl (better known as **PCBs**) and other poisonous and toxic pollutants, and even the million gallon fuel tanks all over the south western part of Saipan without any mitigation plans for proper disposal. Not to forget to mention, this junk was left here on the island without warning to the local residents of the dangers when someone touches or gets near them. Another example, Puerto Rico dump was the military's disposal area for some of this junk and the area has become a public health dilemma as the situation within and around it still contains lots of impurities that even the military themselves now do not know what toxin materials are in there. We, the local people, do not want to fish around that area because we are afraid of what impurities those fish may have been exposed to. The white sand beach to the south of Puerto Rico dump changed over time to purple black like color and the place now smells horrible. Since the time the military left Saipan, Puerto Rico dump remains as it was, as a toxic dump. It still contains the harmful waste materials and worst of all we never hear from the military as to when they will come and properly clean up and dispose of this toxic waste.

The reasons why I am opposed to these military activities in the Mariana waters are:

1. These activities if allow will gradually contaminate our water around our islands and eventually will have strong negative environmental impact on all sea life in the CNMI waters.

rwl
S Scott 11/13/12

2. Bombing activities, when exploded on or in the waters, will have a significant and harmful impact to our marine life such as the fragile plankton. Plankton is a microscopic animal that live on the surface and underwater which can easily be destroyed. Plankton is an important part of the marine life in the ocean. Once these microscopic animals are destroyed Pelagic and all other fish in the CNMI waters will be greatly diminished.
3. Bombing activities along the Mariana Islands will stop us from being able to enter within 12 miles from the firing and bombing zone. We will be forbidden to go to our northern fishing grounds. This will limit my communities fishing capability and will have a significant impact on our fishing industry which will limit the economic growth within the CNMI.
4. My travel industry group in collaboration with Guam tourist industry is now promoting an international cruise ship for the Mariana Islands. The proposed military firing and bombing in the Mariana waters will definitely impacted our tourism economic growth.
5. Farallon De Medenilla (FDM) is an island just about 45 miles north of Saipan. The island is surrounded by a coral reef and it is in its birth stage. The military love to bomb this fragile and god given island. The island has been bombarded for decades and the middle part of the island is almost gone. The destruction is far too great and the water around the island is contaminated. According to one of the scientists from NOAA, who gave a presentation about dolphins, stated that Guam waters is contaminated 20% more than the water in Saipan. I believe that the water around FDM is by far more contaminated than Guam. The pelagic fish that travel thru FDM waters are contaminated. We catch and eat these contaminated fish. Based on CHC record people of the Marianas are dying of cancer practically every week. This is an alarming rate and most evidence points to this being caused by these contaminates left here by the military. Many of my people are dying of cancer and this military venture will only cause more pain and more suffering. My people deserve more than this.

Herman B. Cabrera

My name is Herman B. Cabrera and I am a resident of Saipan. I am in opposed to the proposed military firing and bombing activities on and underwater of the Commonwealth of the Northern Mariana Islands (CNMI).

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Herman B. Cabrera

Written Comment(s) on MITT Draft Environmental Impact Statement
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R. Cage	Submitted via Website	The U.S. military continue to destroy the Earth and the natural world. Please stop and get some help concerning your day to day mundane life style.
C. Calvo	Submitted via Website	I believe it should be in everyone's best interest to take every precaution there is to prevent any disturbance of marine life to their highest extent.
C. Calvo	Submitted via Website	I believe it should be in everybody's best interest to prevent as much harm from being caused to marine life. Absolutely all precautions should be thoroughly considered.
L. Camacho (We Are Guahan)	Submitted via Website	The Draft EIS fails to evaluate all reasonable alternatives. Three alternatives are considered in the Draft EIS, the "no action" alternative, DOD's preferred alternative, and a third alternative that adds 3 major training exercises and adjusts the preferred alternative for air and sea systems command. The Purpose and Need portion of the Draft EIS speaks generally about the importance of testing and training. It also provides an overview of the importance of the existing range. The Drat EIS, however, does not explain why DOD needs to nearly double the size of the existing range. It also does not explore any other configurations that have the potential for fewer environmental impacts. The no action alternative itself is misleading. DOD has presented the no action alternative as a continuation of the MIRC. This process is required for DOD's continued use of the MIRC area for testing and training. There is a significant difference between the status quo, which was addressed in the previous MIRC EIS, and a true no action alternative. The MIRC itself should be considered and evaluated as a separate alternative rather than being presented as a "no action" alternative. DOD is preparing several environmental impact statements covering actions in this region. Several of these are connected. DOD does not appear to have do an cumulative impacts assessment on these proposed actions. DOD should prepare a SEIS that properly complies with all of NEPA's requirements

S. Camacho (Univeristy of Guam)	Submitted via Website	The military build up has its pros and cons, however there are more cons that weighs out the pros. The information that I have searched for through the Internet and from my professors plays a big role here towards this plan for the military build up. Even when looking at a few pictures about the plan and what they plan on occupying and changing will be a huge drastic change for everything on the island and the people living on it throughout the Mariana Islands. I was reading through a news article in the Internet and how there are different opinions within the people living in the island of Saipan. They mainly focus on the economy and the environment towards the island. There are some people who have agreed and want the military build up to happen due to the fact that they think it will boost up the economy, because there many people leaving the island to seek for jobs and better opportunities. The people like for example former Rep. Manny Tenorio is siding the military build up due to the economy and the lack of job opportunities, where he thinks the build up will provide for jobs for the local people and will help the island. However, there are also some people who do not agree with the build up like for example Victoria-Lola Leon Guerrero of the Guam-based We Are Graham, is against the build up, because she is concern for the environment and remembers a past incident within the island due to the military build up. Some people think that there will still be no job opportunities and it will go to off-island workers instead of the local residents. When I was reading another article as well through the internet and where my previous professor of Marine Biology has discussed before dealing with the military build up that the military plans on taking out a huge amount of coral reef habitat on the island of Guam in the Apra Harbor area. The island of Guam's economy mainly depends on the tourism as to what attracts the tourists are the coral reefs habitats, the beaches, and other sites that deals with the environment. There were also other issues that are being concerned like the taxation issue, the issues with water supply, sewage treatment, electricity, and roadways. The surge in wastewater discharge to coastal waters, runoff from construction activities, and the population having to be increased could have damaging consequences for the near shore reefs if proper wastewater treatment systems and erosion-control techniques are not put in place. When looking at a map of the site for the military build up towards the entire region of the Mariana Islands, it was a complete shock towards myself due to the fact that the military will be occupying the whole entire region and it leads the local people to wonder on what will happen to them. The build up is not an easy thing to do let alone it also comes with different types of trainings, testing's, and all sorts of heavy equipment that can affect the people and the island. It can also lead the people to leave the island for good like previous islands from World War II. Anything is possible at this point, so in my view and my opinion. I am deeply concern for all of the islands within the Mariana Islands and Im also against the military build up.

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Name: Reina Lynn Capati

Organization/Affiliation: AOLG

Address:* PB

City, State, Zip Code: 96931

Comments: What I learned from the questions weve asked about the FDM. during the Mariana Islands Training and testing was really convincing and it may be helpful although in the end I know it may destroy the islands especially the Fishes, and species here on island. The guy also mentioned that he would alert the fishermens about the training and testing and itll also be announced before they do the testing. It was good to learn something new tonight. I kind of have mixed emotions about this though.

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J. Capitulo	Submitted via Website	Testing in the Marianas Trench is a bad idea. The Marianas Trench is like one of the greatest monuments in the world that must be kept and not be tampered by using bombs. There are also hundreds of marine life that reside in the Marianas Trench. Thousands of fishes will die which the nearby islanders depend on. Nearby natives will be agitated if not angered if their source of food is gone. Fishing is also a culture to them. Also the testing of the active sonars could disrupts the natural sonars that dolphins and whales have. It will cause them to be confused that they cannot navigate properly. Many of them could die and would ruin the island's source of tourism which could be terrible since some islands only depend on their source of tourism for a source of funds. Training and testing on the Marianas Island is bad idea overall since it will disrupt lives and not just the marine life but the islands as well since it is their home.
M. Caringal	Submitted via Website	Although I am originally from the island of Saipan, I treasure the island of Guam because it is my current home. I can see that the people of Guam are really concern about what may happen to their island. I hear a lot of Chamorros asking "Out of all the islands, why Guam?" And I, too, ask that question. How much more acres of land are going to be taken away just for the testing? Yes, I have heard that the testings will be conducted on the lands already occupied, but what if one day, more land needs to be taken? The Chamorros of Guam may not have any more land to pass down from generation to generation. I understand both sides of the situation, and as long as the testings do not burden the citizens of Guam, then the testings can proceed.
I. Carrera	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
G. Carter	Submitted via Website	To whom it may concern, Im Glenda Carter and currently a student of University of Guam major in Social work. I would like to express my concern regarding to Marianas Training and Testing(MITT) in my island as well as the neighboring island such as the Commonwealth of Northern Mariana Island (CNMI). I understand that the US Navy is preparing for readiness, development, and research to expand the military capability however, I believe that these training and testing will only deteriorates the island natural resources. The marine species will be endangered, and the safety of community will be at risk. Please take any consideration and evaluate carefully on what is the major possible impact of these training and testing to the island of Guam as well as the CNMI. I think every living things deserves to live. Thank you.

G. Carter	Submitted via Website	To whom it may concern, I'm Glenda and currently a student from University of Guam. I would like to voice out my concern regarding to Marianas Training and Testing (MITT) in Guam as well as my neighboring island such as the Commonwealth of Northern Mariana Island (CNMI). I understand that the US Navy is preparing for readiness, development and research to expand the military however, I believe that these training and testing will only endangering our marine species and the possible health risk to the people in the community. According to Natural Resources and Defense Council, they stated that the increase of training exercises will "harm marine mammals and disrupt their migration, nursing, breeding, or feeding, primarily as a result of harassment through exposure to the use of sonar". They also added that although the "sonar use does not result in these or other kinds of physical injury, it can disrupt feeding, migration, and breeding or drive whales from areas vital to their survival". In the article called Sonar* An Effective Herbicide that Poses Negligible Risk to Human Health and the Environment,by www.sepro.com, "Sonar is absorbed through the leaves, shoots, and roots of susceptible plants, and destroys the plant by interfering with its ability to make and use food", which can be harmful to the environment and any thing that is in contact with this hazardous military devices. additionally, the explosive testing is also harmful to humans because of the chemicals such as "combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water-reactive" can cause chronic health effects,health toxins, irritants, damage of mocous membranes, and lungs, skin, and eyes damages. Please take any consideration of these negative factors that very detrimental not only to our environment but also to the lives of billions of people. Please think about the health of your children, grandchildren, and your great-grandchildren and try to understand how they are going to live in this earth with full of hazardous chemicals that you will left behind. :(

Draft EIS/OEIS Comment Form

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Attention: MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

3) Completing the online comment form at **www.MITT-EIS.com**.

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [X] NO [ ] YES

Name: Angelin Castro

Organization/Affiliation: CMTO1

Address:* PO BOX 3746

City, State, Zip Code: Hagatna, GU 96932

Comments: I do not support the military taking Pagan because it is home to many indigineous chamorro people

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F. Cepeda	Submitted via Website	Mariana's islands our sacred and I'm here to defend it our ancestor found the islands for the future of the chamoru people not a testing ground for bombs or for your strategic plans I plan on visiting all the the islands north of Saipan in the future I wanna see the islands the way my ancestor found it so have some respect Uncle Sam you don't see us chamoru people going to the United States of America taking land or bombing any of your lands
F. Charfauros	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
R. Charfauros	Submitted via Website	Please take into consideration the neighboring islands that consist of many diverse populations that call these islands their home.
D. Choi	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands. People have a right to their land—these rights are the founding principles of the united states. The hypocrisy of these policies are outrageous and ignore the fundamental principles of equality and justice. Please stop the exploitation and invest into areas that do not destroy or exploit people. There is a way to find win-win situations and with the innovation of technology, ideas and globalization, there is a better way.
C. Christensen	Submitted via Website	The Draft EIS (DEIS) fails to address the possibility that partulid snail species (members of the genera Partula and Samoana) may occur on Farallon de Medinilla. In Table 3.10-2 (Species Considered as Candidates for Endangered Species Act Listing) the DEIS notes that four species of the land snail family Partulidae occur in the project area. It also states that one of them, the humped tree snail (Partula gibba) is known to occur, or to have occurred, on Guam, Rota, Aguiguan, Tinian, Saipan, Anatahan, Sarigan, Alamagan, and Pagan. No mention is made of the occurrence (or verified ABSENCE) of this species on Farallon de Medinilla. The discussion of the terrestrial environment of Farallon de Medinilla (section 3.10.2.1.5, pp. 3.10-22 to 3.10-23) states that a survey of the vegetation of that island has been undertaken, but makes no mention of a survey of terrestrial invertebrates or, specifically, of a survey the island's land snails. In the absence of survey data verifying that no partulid species inhabit Farallon de Medinilla, it cannot be assumed that these

		species are absent. Although in Table 3.10-2 it is stated that partulid snails inhabit "[s]ub-canopy vegetation in lower strata of intact limestone forests forested and river corridors," the presence (or former presence) of P. gibba on the volcanic islands of Anatahan and Pagan indicates that the presence of (at least) this species on Farallon de Medinilla cannot be excluded on the basis of the information provided in the DEIS.
J. Citizen	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands. The people of the Mariana Islands do not enjoy the privlege of citizenship and do not even get to vote on their own future.
A. Coolidge	Submitted via Website	Please stop destroying our precious cetaceans and ocean environment for the sake of preparing for war. When will the truth be accepted by the military that violence does not keep us safe and that the greed of the military complex is such a large part of the force behind it all? The mentality of war is so retro, i.e. from early Greek and Roman times, somehow continuing in the mentality. Time for transformation. Instead of testing war machines, what about getting into non-lethal games, or music, or challenges that amp up the adrenaline without harming anyone. Why not take some time to simply sit down and listen and talk with "the enemy?" We are all people with feelings and thoughts and beliefs. And the world is abundant enough for all of us. Please -- drop the need to overpower and destroy and instead create a better world -- truly.
P. Crispell	Submitted via Website	I cant imagine a justification for bombing yet another island in the Pacific. Pagan is an inhabitable island and land owners still desire to live there. There are endangered species that will be disrupted by bombing and live fire practices let alone the vehicles and personnel traffic. Including Pagan in a training area will render the island unusable for its native inhabitants and the land owners with rightful claims. The US has destroyed enough natural habitat for its war machine. I realize it wont stop until we have destroyed everything beautiful in the world but it would be nice to leave this one island alone as long as we can.
J. Crump	Submitted via Website	The Navy should not do SONAR testing near Guam or the Commonwealth of the Northern Mariana Islands. The Natural Resources Defense Council (NRDC) is the nation's most effective environmental action group and they state that manmade sound waves, which we know as SONARs drown out the noises that marine mammals rely on for their survival, cause them injuries and death. "Nature," the international weekly journal of science published an article confirming the military's knowledge of their SONAR testing on marine mammal life, in particular the effects it has on whales. So, I plead with the Navy wanting to test around our waters to test elsewhere! Guam and the CNMI are surrounded by marine mammal life. The release of their SONARS will kill almost all of them. There

		are several solutions to prevent injuries and death, but those options cannot be explored near Guam or the CNMI because of our high marine mammal life. There are other water grounds where marine mammal migration isn't as high where SONAR testing can be an option. Let the Navy use other devices to check if marine mammals are nearby before releasing their SONARs. Let us research more about SONAR testing and the effects it has on marine mammal life and until then, let us limit the SONAR intensity until we discover how to avoid serious injuries and death to our marine mammals. Let us meet our military's need for testing and keeping our nation safe without killing a big part of our nations marine life.
A. Cruz	Submitted via Website	I do NOT support the current or proposed Marianas Training & testing activities and recommend the "No Action" alternative. Based on the current geopolitical climate in the region, and on the historical track record in the Marianas, as well as American treatment of Natives in the U.S., it would only serve to further tarnish the American reputation. In would be prudent to encourage and settle first the issue of self determination, particularly in Guam, before mass migration and further land takings occur. It would only serve to affirm America's role as a Democratic and just nation, rather than make it out to be imperialist and a military colonizer.

Draft EIS/OEIS Comment Form

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Pearl Harbor, HI 96860-3134

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Anani Cruz

Organization/Affiliation: Academy of our Lady, Guam

Address:* [redacted]

City, State, Zip Code: Mangilao,

Comments: My main concern is about the marine life. The water around FDM would be "dried off" at certain times just for the testing of bombs and different weapons. When I had questions about the safety of the creatures that lived in the water, few of the people had good answers. I strongly believe that these testings will have nothing but a negative effect on the animals. The koko bird and some other animals that are close to extinction inhabit that land as well.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [/] NO [ ] YES

Name: ARIKA CRUZ

Organization/Affiliation: UNIVERSITY OF GUAM

Address:* PO BOX 5426

City, State, Zip Code: HAGATNA. GU. 96932

Comments: I DO NOT SUPPORT THE PROPOSED MARIANA ISLANDS TRAINING AND TESTING ACTIVITIES I RECOMMEND THE 'NO ACTION ALTERNATIVE' HOWEVER, MY RECOMMENDATION OF THIS ALTERNATIVE DOES NOT MEAN I SUPPORT THE ONGOING TRAINING ACTIVITIES ALREADY OCCURRING IN THE MARIANAS ISLANDS. THE NAVY'S TRAINING AND TESTING ACTIVITIES POSE SEVERE THREATS TO OUR ISLANDS. I WILL NOT ALLOW OUR PEOPLE'S CUSTOM OF HOSPITALITY BE TAKEN ADVANTAGE OF. I WILL NOT ALLOW OUR HOME TO BE DESICRATED AND LEFT TO TROUBLE MY CHILDREN.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Evan A Cruz

Organization/Affiliation: Our Islands Are Sacred

Address:*

City, State, Zip Code:

Comments: We Can no longer continue to allow you to devalue the very islands that we have disrespected inherited from our ancestors.

NO ACTION ALTERNATIVE!

But we do not support the activities already in place.

PEACE IN THE PACIFIC.

Visit **www.MITT-EIS.com** for project information.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

M. Cruz	Submitted via Website	What exactly are the military's plans for the region?
M. Cruz	Submitted via Website	Although the Mariana Islands Training and Testing (MITT) Environmental Impact Statement (EIS) provides information to the public regarding the proposed action that will be taken by the United States Navy, from the perspective of certain sects of the general community on the island of Guam, the EIS fails to provide information specific and concrete enough to assure the community of its safety. This comment will focus on the effects that the U.S. Navy's proposed actions may have on the sea life in the region. Although the EIS, along with the website that is provided for it to inform the public, states that "[p]rotecting the marine environment of the Mariana Islands is an important goal for the Navy," the supporting documentation provided fail to justify this claim. The importance of this goal comes to question when one reads he Department of Defense's "Marine Mammal Stranding Report," which reports that despite the presence of "… marine mammal mortalities associated with Navy activities, the root causes are not clear in most cases. (42)" Reports such as these, along with the MITT/EIS website, which is riddled with generalities and vague statements regarding the "strict guidelines and … measures" employed by the U.S. Navy do little to assure the public and concerned communities that the Navy is indeed taking measures to ensure the safety and welfare of sea life in the region. Further, these reports are contradicted by sources like Peter Eisler, whose article implies that the Navy is doing very little to understand what wildlife may be affected by their training activities. The purpose of this comment is not necessarily to state that the U.S. Navy is explicitly participating in activities that will be harmful to the community (or to accuse them of doing so); it is to question and examine the specifics of the information that the U.S. Navy is providing for the general public. The resources discussed in this comment contain so many general statements and lack so many specifics that it would be difficult for any concerned individual of the community to truly absorb and believe that the U.S. Navy is indeed concerned about the welfare and safety of sea life in the region, and that the same train of thought can easily be extended to the Navy's concern for the people of these regions.
S. Cucinotti	Submitted via Website	It would serve us all well if we protect the environment!

G. Dahtah	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Geraldine Datuin

Organization/Affiliation: Student - UOG

Address:* 783 L Carnation Ave Latte Hts. Gu. 96921

City, State, Zip Code:

Comments: I do not support the proposed Mariana Islands Training & Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already ocurring in the Mariana Islands. The Navy's training & testing activities pose severe threats to our islands"

Visit **www.MITT-EIS.com** for project information.

*Provide your mailing address to receive future notices about the Mariana Islands Training and Testing EIS/OEIS.

10 December 2013

Dr. Justine B. de Cruz
5 Osgood Ave.
New Britain, CT 06053

Naval Facilities Engineering Command Pacific
Attention MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100 Pearl Harbor, HI 96860-3134

To the Project Manager MITT EIS/OEIS:

Thank you for the opportunity to comment on the Draft Mariana Island Training and Testing EIS/OEIS. Generally, I believe the document covers the effects of the proposed actions in detail and is well written. Sections 2 and 3 that detailed how the analysis was carried out, what other alternatives were considered (and why they were omitted from further consideration), and the extensive information on explosives, weaponry, and proposed activities written for those with non-military backgrounds were especially appreciated.

Exceptions to the general high quality of the document are the sections on terrestrial species. These sections seem to have more errors of fact, often struggle with grammar or are awkwardly worded, and lack coverage or data for the Marpi Maneuver Area on Saipan. Therefore, most of my comments and suggestions will focus on sections 3.10, 4.3, 4.4, and 5, with specifics given below:

Section 3.10.2.3.4.2 Population and Abundance [of swiftlets] states that there are 10 known nesting caves on Saipan but there is a discrepancy with Figure 3.10-7 that lists only eight.

Section 3.10.2.3.6.4 Status within the MITT Study Area [of common moorhen] does not give any information on the status of moorhen in the Marpi Maneuver Area on Saipan.

Section 3.10.2.3.8.4 Status within the MITT Study Area [of megapodes] does not give the status of megapodes on either Rota or Saipan. As this is one of the endangered species that is found to be adversely affected by several of the proposed actions it might be a good idea to improve the information in this section. The species is not known to be present on Rota (and this should be stated), but the megapode has been documented by surveys in the Marpi Mitigation Bank and the Bird Island Conservation Area that are both in close proximity to the Marpi Maneuver Area on Saipan. More information would be helpful here.

Section 3.10.2.3.9.8 3.10.2.3.9.8 Status within the MITT Study Area [of reed-warblers] cites a 1992 paper by Craig which indicates that reed-warblers exist in Saipan's proposed Marpi Maneuver Area. This is not very exact information on the bird's status in the area and is also based on surveys conducted over 20 years ago. Camp, et al. (2009), which is a paper cited in your references, analyze more recent survey data. Perhaps the information in this paragraph could be updated.

Section 3.10.2.3.11.3 Status within the MITT Study Area [of fruit bats] gives the status of this threatened species in all the other areas where activities are proposed except for the Marpi Maneuver Area. Fruit bats are sighted on Saipan with some frequency, often in the northern areas of the island including Marpi. Surely their status in this region should be given here, and if unknown, surveys should be conducted.

Section 3.10.2.4.1 Partulid Snails and Section 3.10.2.4.2 Mariana Eight-Spot Butterfly (*Hypolimnas octocula mariannensi*) and Mariana Wandering Butterfly (*Vagrans egistina*) include no information on the status of either

snails or butterflies in Saipan's proposed Marpi Maneuver Area. It seems that surveys have recently been conducted in the other proposed areas for these species, but not in the Marpi area where karst limestone, abundant host plants, and limestone forest co-occur. Why hasn't this been done?

Section 3.10.3.1.1.1 No Action Alternative box states that "Explosions on FDM may affect, but not likely adversely affect, the Mariana fruit bat," followed by "Explosions on FDM may affect, and are likely to adversely affect, the Micronesian megapode and Mariana fruit bat." Mariana fruit bats can't have it both ways; which is it?

Section 3.10.3.2.1.1 No Action Alternative[with respect to low level helicopter training at Fena Reservoir] about the middle of the fourth paragraph states that "Mariana swiftlets leave caves located on the facility primarily at dusk and return at night. Some swiftlets, however, may leave caves during nesting periods to incubate eggs and to feed hatchlings. Most of the swiftlet activity outside of caves does not occur during helicopter flight times." These three statements are inaccurate. Swiftlets leave their nesting caves during the day to forage and return to them at dusk. During nesting periods, birds are present in the caves during the day while incubating eggs but frequently fly in and out of the caves during the day when feeding nestlings. Most swiftlet activity outside of the caves occurs during daylight hours (whether nesting or not) so that they would be active during helicopter flight times. The errors of fact need to be corrected.

Same section, paragraph five states: "There is an elevated risk for night exercises for the Mariana fruit bats [sic]....". Does the writer mean that there is an elevated risk to bats *during* night exercises? The paragraph goes on to state in an awkward way that night dispersing bats may co-occur with night time training in open areas, but rates the likelihood of injury or mortality as "discountable". Would that be a 30% or 40% discount? Or is the risk of contact low? The conclusion box following the paragraph states that: "Aircraft and aerial target strikes during training activities under the No Action Alternative may affect, but not likely adversely affect the Mariana fruit bat or the Micronesian megapode." This conclusion is confusing after having just read that the risk to night foraging fruit bats is elevated. Also, the Micronesian megapode was not discussed in this section at all and if it is likely to be affected, then the reason should be stated. It also seems likely that the swiftlet might be impacted. These paragraphs deserve some additional attention.

Section 3.10.3.2.1.2 Alternative 1 and Alternative 2 Training Activities [for fixed- and rotary-wing aircraft overflights] conclusion box indicates that Mariana fruit bats and Micronesian megapodes might be impacted without a discussion of how that might happen. This is confusing given the conflicting statement that most flights would be at "high altitudes where wildlife species, including ESA-listed species, would not co-occur with aircraft." Clarification is needed.

Section 3.10.3.2.2 Impacts from Military Expended Materials Including Explosive Munitions Fragments. The sentence in the first paragraph, "Munitions are only dropped on FDM; therefore, only activities that expend munitions that occur at FDM are included for analysis" should be moved to the end of the paragraph for clarity. Also, the second paragraph concludes with some oddly structured sentences: "On FDM, the range area where ordnance is restricted to inert munitions, vegetation is recovering in vertical structure and surface cover, relative to range areas where high explosive ordnance is permitted (U.S. Department of the Navy 2008c, 2012). Micronesian megapodes have been observed —within this area, although in apparent lower densities relative to areas north of the "special use area" where no live-fire training occurs (U.S. Department of the Navy 2008c)." Because the 'special use area' of FDM *is* the north of the island (Fig. 2.1-10) it might be less awkward to say: "In the range area on FDM where ordnance is restricted to inert munitions, vertical vegetation structure and surface cover is greater than in range areas where high explosive ordnance is permitted (U.S. Department of the Navy 2008c, 2012). Micronesian megapodes have been observed within the inert munitions area, although at a lower

density than in the northern area of the island where no live-fire training occurs (U.S. Department of the Navy 2008c)."

Section 3.10.3.2.2.1 No Action Alternative Training Activities [use of explosives on FDM] contains several awkward phrases at the end of the first paragraph. I suggest re-wording the last two sentences to read: Mariana fruit bats are not likely to be struck by munitions because bats are expected to occur only in the relatively closed-canopy forests in the "special use area" where ordnance is not used. Also FDM is believed to be little used by foraging bats transiting between islands (U.S. Fish and Wildlife Service 2010a). The possibility of injury to or mortality of individual transient fruit bats may be low, but is not negligible.

Section 3.10.3.2.2.2 Alternative 1 Training Activities [number of bombs, projectiles, missiles, and rockets that may be dropped on FDM]. It is difficult to see how exponentially increasing the amount of ordnance dropped on FDM (an increase from 2,900 small caliber rounds to 42,000 under Alternative 1, for example) would have the same impact on terrestrial species as the No Action Alternative. It seems unlikely that megapodes and fruit bats would recognize that there is a "No Fire" safety zone set aside on the island (based on the Navy's surveys of seabirds that continue to nest in no fire, no live fire, and live fire zones despite repeated bombardment). The conclusion that the impacts on species under Alternatives 1 and 2 would be the same as under the current or No Action Alternative, given the increases in explosive ordnance use, is unjustified.

Section 3.10.3.2.4.1 No Action Alternative, Alternative 1, and Alternative 2 Training Activities [that involve high explosive detonations on FDM]. Do the terms "No Drop Zone", "No Fire Line", and "No Fire Zone", all used in this section, refer to the 'special use area' of FDM? Can a consistent reference to this area be adopted?

Section 3.10.3.3.1 Impacts from Invasive Species Introductions. This section describes various pathways, pertinent to the military, by which a species may spread from a point of origin. I suggest that the first three paragraphs be edited closely for verb/noun agreement, errors in the use of parentheses and other typos, grammar, and clarity. In paragraph four, the first sentence maintains that the Navy inspects 100% of outgoing vessels and aircraft, which conflicts with the second sentence that states what the Navy does when it misses inspections; I'm sure 100% inspection is the goal, but what is the actual percentage inspected? And last but not least, the final two paragraphs of the section do not describe invasive species impacts but rather the actions taken by the Navy to avoid new introductions and to mitigate for an introduction to Guam that had disastrous consequences. Glaringly, this section does not either define what an invasive species is, does not describe the impact of an invasive species on insular organisms, and only tangentially refers to the brown tree snake, the organism that is at the root of the large containment effort. I urge that this section be re-written to focus less on generalizations and more on why the brown tree snake's introduction had such a devastating impact on Guam, as well as the potential risk for its introduction to new areas by the various pathways described.

Section 3.10.3.3.1.1 No Action Alternative, Alternative 1, and Alternative 2 Training Activities [with regard to invasive species impacts] concludes that the No Action Alternative, Alternative 1, and Alternative 2 would not increase risks to wildlife resources, species or habitats within the Study Area. While it is true that the kinds of pathways invasive species make use of to enter, establish, and spread from DoD installations may not change among alternatives, it is false to say that the risk of introduction does not increase with an increase in number of vehicles/personnel/food/landings, etc., that might transport an organism from an area where it is established to an area where it is not. Using humans as a disease vector for an example, a factor from those listed in Figure 3.10-10, it is easy to see that the more frequently a person infected with a virulent disease comes into contact with an uninfected population, the more likely the infection rate in that population is to rise (virulence x number of contacts = infection rate). An 'infection', or the introduction and spread of an invasive organism (say seeds of a weedy plant or tree snakes), has often followed a similar pattern. If the number of urban warfare training missions on Tinian and Rota increase from 17 (the No Action Alternative) to 36 (Alternative 1) and personnel and

equipment will be transported from Guam, the chances of stow-away introductions increases. If helicopter landings during direct action trainings as described in 3.10.3.2.3.2 are increased from 3 to 18 under Alternative 1, the number of contacts between potentially 'infected' aircraft or personal and an uninfected environment also increases exponentially resulting in increased risk of 'infection' (or invasive species introduction). So the conclusion that Alternative 1 and Alternative 2 do not increase the risk of secondary stressors to vegetation communities and wildlife resources is faulty.

Section 3.10.3.3.2.1 No Action Alternative, Alternative 1, and Alternative 2 Training Activities [with respect to stressors associated with impacts to water and air quality] does not discuss the impacts on Micronesian megapodes on FDM. However, the conclusions in the box following the text state that secondary stressors may affect and are likely to adversely affect megapodes on FDM. The discussion of these issues has been omitted....it would be good to include further discussion of those impacts here.

Section 3.10.4.2.2 Summary of Endangered Species Act Effects Determinations. The word "to" has been omitted between 'likely' and 'adversely affect' in the third sentence of the first paragraph.

Section 4.3.3.1 Army and Air Force Exchange Service on Saipan lists the new shopping complex at Andersen Air Force Base on Guam but nothing for Saipan. Is there a new building on Saipan as well?

Section 4.4.6.9 Cumulative Impacts on Sea Turtles states that: "The Preferred Alternative could also result in injury and mortality to individual sea turtles from underwater explosions, sonar, and vessel strikes." This doesn't jive with the paragraph's last sentence: "No sea turtle mortalities are estimated for Alternatives 1 and 2", the estimate coming from the model outlined in the previous volume of the EIS for sonar and non-impulse acoustical events. This seems to be misleading because explosions clearly produce an impulse, making the application of the model suspect. Or does this mean that the level of sea turtle mortality from underwater explosions proposed under the Preferred Alternative cannot be estimated?

Section 4.4.7 Marine Birds states that: "Potential responses would include a startle response, which includes short-term behavioral (e.g., movement) and physiological components (e.g., increased heart rate)." I believe that this belittles the potential impacts of mortality from air strikes, live gun fire, and underwater explosions on seabird populations. Mortality of breeding adults, especially for long-lived seabirds, can have a huge impact not only upon individuals, but also on population structure and population genetics; that impact would be quite a bit more long-term than a startle response.

This section goes on to state that the "incremental contribution of Alternatives 1 and 2 to cumulative impacts on birds would be low" for several reasons including that "Alternatives 1 and 2 would not result in destruction or loss of nesting habitat". Given the large increase in training and testing activities planned for FDM under the Preferred Alternative and given that seabirds nest all over the island, including the active strike zones, this statement is unlikely to be true.

This section also states that: "For most stressors, impacts would be short term and localized, and recovery would occur quickly", and that "While a limited amount of mortality could occur, no population-level impacts would be expected." I don't think that either of these statements is true given the plentiful studies of the impacts of multiple stressors (such as mortality due to predation, trampling, and grazing) repeated over many years that have limited many long-lived seabird populations to the point where they have dwindled to endangerment if not extinction. Hawaiian seabird populations are a good example of such cumulative, long-term, but not negligible, impacts. How many impacts, assessed as making a relatively low contribution to the cumulative impact of man plus nature, does it take to push a population, incrementally, into serious decline?

Section 4.4.11 Terrestrial Species and Habitats reiterates the same kind of misleading statements as found in the section above (e.g., "Potential responses would include a startle response" and "Recovery from the impacts of most stressor exposures would occur quickly"). As pointed out earlier, there would be no recovery from fatal stressor exposures.

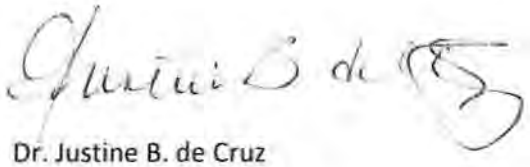
Section 4.4.11.2 Summary of Endangered Species Act Effects Determinations mentions only the cumulative impacts of the proposed actions affecting Micronesian megapodes on FDM. The summary fails to mention the other species that are earlier listed in this EIS as likely to be adversely affected by various proposed activities. The omissions include the common moorhen on Tinian, the nightingale reed-warbler on Saipan, the Micronesian megapode on Tinian and Saipan, and the Mariana fruit bat on islands throughout the MITT Study Area. Does this section need to be expanded?

Section 5.3.1.1.1.1 United States Navy Afloat Environmental Compliance Training Series sounds like an excellent training tool, especially for Lookouts. It meets military effectiveness and readiness policies, provides a level of expertise for constantly changing personnel, and presumably helps to reduce the impact of military activities on marine organisms. It is a great idea. Although the EIS avows that the "Marine Species Awareness Training is an effective tool for improving the potential for Lookouts to detect marine species while on duty, " I wonder how the effectiveness was evaluated. Is there a cipher that can be cited as to the difference in number of sightings by trained vs. untrained Lookouts? or perhaps the difference in sightings between Lookouts not undergoing the same training as those undergoing the Series?

And lastly, a general question about mitigation measures in Section 5. I note that the mitigation measures for Section 5.3.2.1.2.4 Mine Countermeasure and Neutralization Activities Using Positive Control Firing Devices and for Section 5.3.2.1.2.5 Mine Neutralization Diver-Placed Mines Using Time-Delay Firing Device include ceasing detonations if seabirds are sighted within the mitigation zone. This is laudable. My question is why do the rest of the activities (gunnery exercises, missile explosions, etc.) halt detonations only if marine mammals and sea turtles (but not seabirds) are spotted? Can seabirds be reasonably added to the 'cease detonations' list for activities such as anti-swimmer grenades and sonoboy detonations, for example?

Again, thank you for the opportunity to comment on the Draft MITT EIS/OEIS.

Sincerely,



Dr. Justine B. de Cruz
Beach Biology
former CNM-DFWI Wildlife Division Supervisor

K. De Leon (Electronic)	I fully support the military and their endeavors to help protect the Mariana Islands. However, there is a thought as to how this would affect us. With all your testing, will you at least notify the people as to when the testing will happen, and what kind of testing you will do?
M. De Oro (Electronic)	I do not support the current, or on going or future actions in regard to military testing and training in the Mariana Islands. The comment period was inadequate and access to this document was limited. The language used was also above the level of understanding for most residents in the Marianas.

Draft EIS/OEIS Comment Form

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Attention: MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

3) Completing the online comment form at **www.MITT-EIS.com**.

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: DelaCruz. Whisperingwillow

Organization/Affiliation: University of Guam

Address:* P.O. Box 622

City, State, Zip Code: Hagatña, Guam, 96932

Comments: I do not support the proposed Marian Island traning and testing activities. I recommend the 'No Action Alternatwe'. Howeuer my recommendation of this aHernative does not mean I ~~[illegible]~~ support the ongoing training activities already occurring in the marian Islands. The Navys traing and testing pose severe theats to our islands!!

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*Provide your mailing address to receive future notices about the Mariana Islands Training and Testing EIS/OEIS.

C. Delacruz (Electronic)	Our island is sacred and our ocean is magnificent, don't add to what has been already threaten and taken away from us by the military. "I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Marianas Islands. The Navy's training and testing activities pose severe threats to our islands."	Thank you for participating in the NEPA process. As per CEQ interpretation on the "No Action Alternative," the "no action" is "no change" from the current direction or level of intensity; therefore, the "no action" alternative is continuing with the present course of action until the action is changed. At the conclusion of the Final EIS/OEIS, the Navy will determine whether the alternatives provide enough training and testing to meet the purpose and need. The DoD, as much as is practicable, will reduce/minimize potential impacts when conducting military training and testing activities. The military is committed to protecting the terrestrial and marine environment during the conduct of its military training and testing activities.
S. Demapan (Electronic)	It is understandable that our geographic isolation combined with our proximity to a major military outpost on Guam would make Pagan a very appealing site for military training and testing. The trouble is less about relocation and more about preservation of our already limited resources and land. Monetary compensation cannot replace the legacy of a habitable island that holds roots to indigenous past.	Thank you for participating in the NEPA process. The military is committed to protecting the terrestrial and marine environment during the conduct of its military training and testing activities. Military activities proposed on Pagan are addressed in the CJMT EIS/OEIS. Information regarding the CJMT EIS/OEIS can be found at: http://www.cnmijointmilitarytrainingeis.com.
N. Desai (Electronic)	I oppose the American military's expansion on Guam. The islands have suffered enough under American rule and deserve the rights of citizens, not an even larger military presence.	Thank you for participating in the NEPA process. The military is committed to protecting the terrestrial and marine environment during the conduct of its military training and testing activities.
A. Diaz (Electronic)	As a former member of the US Navy, I am aware of the trash that is dumped overboard of the ships while underway, among other things. I have personally seen it. Though there are regulations and scheduled times of trash collecting, I also know that trash is illegally thrown overboard, to include hazmat when facilities on the ship are closed, or because XO Happy Hour has ended and the trash needs to disappear, or a Sailor is too lazy to stand in line. When darkness falls, anything goes and who knows what is thrown overboard when no one	Thank you for participating in the NEPA process. The U.S. Navy complies fully with the requirements of Annex V of the MARPOL Convention as directed by the Act to Prevent Pollution from Ships (33 U.S.C. 1902) and modified by the National Defense Authorization Act for Fiscal Year 1994. The Navy expanded the geographic scope of this EIS/OEIS to analyze the potential environmental impacts of training and testing activities in areas (not covered in previous NEPA documents) where training and testing activities historically occur. The military is committed to

	can see. If ships are to be used in conjunction with these exercises or have more presence in the area, I do not want that trash to be anywhere near my island. The MARPOL annex outlines what may or may not be thrown overboard from a ship http://ocean.floridamarine.org/efh_coral/pdfs/Habitat_Plan/HabitatPlanAppL.pdf Most ships honor this, what makes the Navy so special or unique? Another issue I have is the US amassing more area to conduct training. An area the size of Washington state? First the US and the military take control of over 30% of my island of Guams total land area, then the military wants to seize and use more islands in the Mariana archipelago, and now the US military wants to extend the zone of which they currently use for military exercises? Why cant all the training be conducted stateside off the coasts of the US before pilots and service members PCS? Or sent to Hawaii for that matter? Is it because US soil is more valuable than my island and the rest of Micronesia. Every time the US military tests and explodes something in or from Micronesia, it is a catastrophe more or less. I do not want my people to experience anything close to what the people of the Marshall Islands like Bikini Atoll did. http://www.nuclearclaimstribunal.com/biksum.htm The Mariana Islands and the reset of the islands in Micronesia are sacred. Stop using and exploiting our lands to promote and further US agendas and policies.	protecting the terrestrial and marine environment during the conduct of its military training and testing activities.
J. Diaz (Electronic)	My dear friends, please do not do anymore harm to our homelands on Guam. While I totally understand the objectives of the Nixon Doctrine, we need to look at better ways to work in collaboration with our neighbors to the East, North, South, and West. Please consider the situation and look at other viable options. I want to thank you for looking within your	Thank you for participating in the NEPA process. The military is committed to protecting the terrestrial and marine environment during the conduct of its military training and testing activities.

	own footprint, but I'm not sure if this is the best option. What I would like for the Department to consider as well as the Pentagon, is to look at what our boys and gals really need and that's family and friends in the towns that they grew up in, to be the local hero's and heroines. This is the reason why I support the total withdrawal of our troops and to work in collaboration with other nations. I don't know about you, but I sure am tired of war and death and destruction and all of that nonsense. While Freedom is never free and while I absolutely support our U.S. troops in the line of duty and in harm's way, what I don't understand is "tearing down paradise to build a parking lot." We have done a wonderful job, but I hope that we can look at all the altervatives of how to best us resources in a time of huge crunches. Please remember that U.S. Congress has much on its plate this coming January 2014 when they go back for rounds of talk to avert another government closure. It makes sense to bring back the troops and have them employed on the local side. We need to think about the better ways in which we can foster peace within the region - the main reason why Guam was created the Tip of the Spear, but I believe that TOGETHER with the local community and backed by the expressed opinions of the troops themselves, why not consider some of the alternatives of our young people at We Are Guahan. And lastly, we need to look at first creating a better and lasting legacy of Freedom in this region and to look see Guam's Decolonization effort a noble endeavor indelible to U.S Democracy and Values. Please give the Chamorro People of Guam as chance to determine their future and with the help of the members of the United Nations, especially those who sit on Global security, we can find sustainable ways to promote those values that most Americans enjoy. Why can't we give the Chamorro people their chance to vote for their determination. Please. It is	

	already late and I just want the U.S. Government to finally recognize us as their Warriors who are in harmony with their roots, their human dignity and their full human right. While I recognize that there are many who are against such as plan of decolonization, this is the first step that needs to be done before you decide to use any more "space" on a very contaminated island. We need to focus clearly on achieving World Renowned healthcare on Guam. If we begin there, then we can achieve perhaps what the U.S. Marines were set out to do in the first place! I love all members of the U.S. Military and especially to all our Veterans. What we advocate for is not anti military, but just saying that the whole world deserves to see Pagan too. Don't you think? And so now you understand Paradise - the Garden of Eden - that's the Marianas my friends. While there are breathtaking places all over the world that are far superior than mine, I like to think that its "ours" and for "all generations." Please don't take anymore than we have already chewed. I love the United States of America and I sure love the country and the lands that I was born and hope that you can see that there is love deep down from all these comments and I hope that we can look at bringing in more troops, especially for rest and relaxation after training. I totally "get it" and why all of this is necessary, but I just hope that we can move forward, together as one people that want one thing - PEACE! Happy Feast of Our Lady of Guadalupe - the Feast of the Virgin of the America's who appeared to many "indigenous peoples" and who we hail as the Mother of the Savior of the World! May this Holiday season never be forgotten and that the love of a mother to a son who was the world to her, is akin to the love that we have for the islands named after Mary - Marianas! I hope that we can look at these archipelego islands as absolutely Sacred! The world needs the Marianas and we need the World! Here's to a	

	United Marianas effort honoring the human right to be part of that table with all the nations of good will! May God who is the Almighty and the Awesome One be at the center of this sacredness as this Creator created us and our islands for a reason! Please give us a chance to join forces with the rest of the world! Long Live the United States of America, it's Armed Forces - connected to families that we are all a part of, and May God Bless Guam, Rota, Tinian, Saipan and all the Mariana Islands. Please end all wars and let us begin with the ones that start within us all. Remember, we are ONE WORLD, ONE NATION, ONE HUMAN RACE! Saina Ma'ase, jon	
J. Digno (Electronic)	I know it is in the military's best interest that the people of the Mariana Islands and military forces get along during this process of amalgamation. Hopefully through the open house discussions, everyone will get along.	Thank you for participating in the NEPA process. The military is committed to protecting the terrestrial and marine environment during the conduct of its military training and testing activities.
J. Drake (Electronic)	Western Pacific marine life and oceanic territories are gravely threatened by the US Navy's military operations and exercises in that region. The USN's own continued surveillance and research of the impact of these operations exposes a troubling reality which indicates that there are few measures that can protect the region from future harm if they continue. Therefore I urge they be abandoned, or greatly modified if not completly ended.	Thank you for participating in the NEPA process. The Navy shares your concern for marine life. Potential effects from military training and testing activities were analyzed in Chapter 3 (Affected Environment and Environmental Consequences) of the EIS/OEIS. Also, as described in Chapter 5 (Standard Operating Procedures, Mitigation, and Monitoring) of the EIS/OEIS, the Navy implements, to the maximum extent possible, mitigation measures during its training and testing activities. The military is committed to protecting the terrestrial and marine environment during the conduct of its military training and testing activities.
J. Duenas (Electronic)	another pre-empt for the navy.do it in malibu beach,calfornia. not in the mariana islands.	Thank you for participating in the NEPA process. The military is committed to protecting the terrestrial and marine environment during the conduct of its military training and testing activities.

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   Attention: MITT EIS/OEIS Project Manager
   258 Makalapa Drive, Suite 100
   Pearl Harbor, HI 96860-3134

3) Completing the online comment form at **www.MITT-EIS.com.**

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Ian Catling

Organization/Affiliation: Nasion Lina'La Kotturan Chamoru

Address:*

City, State, Zip Code:

Comments: Any sovereign nation would receive monetary compensation for the use of their territorial space for another governments military training. There is no reciprocity here, just a blatant use of eminent domain.

In terms of mitigation, 12 surveys spanning over 35,000 kilometers of track line covered and requiring over 3,000 hrs of visual and sound recording, yet there is no demonstration for understanding the migration patterns of marine life. If you're looking to dissolve any issues between fishing boats and military training zones, then place the training zones in areas...

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(continued from front)

... that are proved to receive little or no migratory traffic. The Fishermen Follow the Fish. If you're training where there is reportedly no migratory marine traffic, that you won't have a problem with the Fishermen

H. Elias	Submitted via Website	As islanders, we know that land and sea is a crucial factor for survival. The least we can do is to create an awareness regarding this situation so that most island resident can work together in protecting our land and sea from destruction. Our islands are sacred, be sustained for the generation of tomorrow. Lets maintained the beauty of our islands as it is right now, cause most of it was being used for the benefit of civilizing our people during the first colonization till now.
S. Elias	Submitted via Website	As a concerned islander and student, I strongly uphold the importance of our islands because our islands are sacred and deserve to be taken cared of not be destroyed. For instance, Guam is already known as the hottest in the region and I can't imagine when the military finally really moved to Guam. Besides destroying the land and the sacred of our islands, my other biggest concern is the Marine Biodiversity in Apra Harbor. Our islands value the ocean so much and we cannot just let it be destroyed and taken away from us. "This operation (CNMI Military Relocation, or military buildup) could be one of the largest peacetime military buildups in U.S. history. Underwater tests close to the surface can disperse large amounts of radioactive particles in water and steam, contaminating nearby ships or structures." (Marler and Moore 2011). As I did my research, I come to a point where I know that our ocean especially the Coral Reef is going to be affected as much as our lands. I also know that most concerned citizens will be voicing out the importance of our lands so I chose Apra Harbor as a case to support this relocation of the Military bases to our Marianas Islands. "Apra Harbor is the largest deep-water port in the Western Pacific and the busiest in Micronesia. Within this port are over 70 acres of coral reefs that will be destroyed in the process. The port is of vital importance not only for the U.S. Navy but also as a tourist attraction for its wealth of marine life—its unique habitats host many species not found elsewhere in the archipelago, as well as some of the highest coral covered." (Paulay 2003). Finally, I am also a strong-minded islander and I strongly believe that the relocation of the military bases will not only affect our lands and ocean but most importantly our people. Because the land, the ocean, and the people together is what makes it sacred, the more we destroy one of these aspects of our cultural being, the less sacred we are. Knowing the consequences and what our islands would be like if the relocation is passed really saddened my heart. I honestly cannot handle the pressure and the kind of communities we will become. Most especially, our children or the future generation, they will grow up without knowing that our islands were once sacred or our home islands and the culture where we value family and society so much. It would be really hard because the influence and the environment our children will grow up and see will be different than what we see now.

D. Erway	Submitted via Website	We need pristine islands and their surroundings, much more than we need military practice fields. Just say no to this whole idea! We need a much smaller military over all, to be MORE secure, by scaring the rest of the world less. Please stop to travesty! Don
D. Ezekiel	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to a population with insufficient oversight and say in the matter.
F. Famalao'an	Submitted via Website	As women of Guam, we, the members of Fuetsan Famalao'an (Strength of Women), submit the following comments. First, we have submitted comments for previous Environmental Impact Statements (EIS), and for each, we have been concerned about the short timeframe for comment. For an extensive action such as the Mariana Islands Testing and Training (MITT), we object to a restricted comment period such as this, and request that an extension for comments be allowed until after the holidays. Based on previous EIS comments we have submitted, we find that many of the issues we were concerned about then are still those we are concerned about today with the MITT EIS. One such concern is that this EIS process has not allowed the local community or local officials any interim access to findings of the off-island consultants hired by the Department of Defense (DoD) to assess the impacts to us. Similarly, as with the 2009 Draft EIS for the Mariana Islands Range Complex (MIRC), DoD disregarded our concern about continued degradation of our lands and waters, and the continued risks to our health and safety. Further disregard is evidenced today in the preferred alternative option to expand the existing testing and training area to accommodate the MITT. Based on the alternative options described in the MITT, an increase of firing ranges and warfare training on our lands and waters may be imminent. This includes Pagan, and Guam, and other lands, oceans and skies within the Marianas. We object to any DoD claims that there is minimal or no negative impact because the testing and training already taking place. In fact, we insist that further analysis be conducted to guarantee that the existing training and testing is not in violation of our rights as indigenous women to protect and defend our families and our environment. Our everyday efforts to sustain our families and our environment are at risk if we allow for the operation of live firing ranges and warfare training on Guam or any of the Marianas Islands. Thus, as our policy, we advocate for an environment free of warfare and munitions testing and training, and we object to DoD's preferred alternative (including Pagan) to expand the existing MIRC and double the size of the testing and training range. Based on these few comments and our

		previous experience with the EIS, we have little to no confidence at all in this process. In spite of that, we register our objection to the continuation and expansion of such actions in our region, and insist that the involvement of the women of our islands continually be sought to ensure a balanced position is included in this process.
M. Flores	Submitted via Website	I am writing to OPPOSE the expansion of the Marianas Islands Training and Testing site. The expansion would not only cause further degredation in our delicate ecosystems, negatively impacting our nearby waters and skies, harming whales, dolphins, and corals, it would also reflect a continued expansion of American imperialism and colonialism, and more so environmental racism against the people of the Marianas. Beyond being a US territory, the people of the Marianas are part of an oceanic community, having knowledge of ocean highways and a deep understanding of sustainable resource management. Much of this has been drastically altered throughout our colonial history, bringing a loss of sacred knowledge and language. Great work has been done to reconstruct these lost narratives for the survivorship of Chamoru people. But even more so, the decision to expand the site emphasizes the continued objectification of native communities carried on by the United States. We are not separate from our environment - we are the earth, we are the oceans. The harm we do to our planet manifests in our bodies and in our cultures.
L. Galindo	Submitted via Website	I am horrified that our nation would even consider funding a proposal to destroy pristine islands in the Pacific. i witnessed the horror of the bombing on Kahoolawe in Hawaii. Not only is it immoral, the MITT would violate the National Environmental Policy Act and other environmental laws passed by Congress. On behalf of the people, the marine mammals and the endangered plants & animals of these sacred lands, I beg you to halt this proposal now! Thank you. Sincerely, Lauryn A Galindo
F. Garcia	Submitted via Website	1. The Draft EIS states training activities will be limited to Rota International Airport but it does not describe what type of activities will happen on the airport or if there will be any construction needed at the airport to support training activities. The EIS should determine what are the potential effects on airport operations and environ. 2. Any proposal to use Rota International Airport (or any airport within CNMI) must be coordinated with the airport sponsor - Commonwealth Ports Authority (CPA). Has this been coordinated with CPA? 3. CPA will require execution of a Ground Operations Plan and SOP.

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

J. Garrido	Submitted via Website	The MITT EIS/OEIS for the Mariana Islands, including Guam, is too hugh a proposal and too much of a sacrifice to impose on the Chamorro people who have already given away much of their island and lost more of their history and culture than most nation of people could bare. MITT proposal is an action that would adversely affect the the life and territory of the Chamorro people. It is also a violation of their human right that would further erode and undermind their right to exercise their right of self-determination, as setforth in the United Nation decolonization process for non-self-governing peoples and territories. Under Free Association, there is recognition of mutual sovereignty and mutual respect. The United States has much to learn about true democracy, a terrible stigma on a Nation that created it. jose ulloa garrido, Chairman Task Force on Free Association
A. Gill	Submitted via Website	The island of Guam and all the Marianas Islands as well as surrounding continents are inhabited. The consequences of the MITT operation to these lands and their people need to be clearly posted and noted to the people before any such operation. We can appreciate the need to be prepared for any such tactical defenses that this operation may be training for, but at what cost? Clearly our government has no concerns of the little people on any side of the line, be it training or actual conflict. Are the islands and their people to be a collateral damage to this operation?
C. Graham	Submitted via Website	Clark Graham OK, we are having a meeting to discuss the Environmental Impact Statement... We are going to blow things up, probably on land and underwater, and we will use sonar that we know is harmful to marine mammals (our brothers). What are the results of these actions? We will alter the natural land and marine environment negatively, we will kill and maim animals including birds, fish, mammals... Conclusion: It is HORRIBLE for,the environment. Testing at an uninhibited island in the state of HI. Result: destructive to land and sea. Testing at Bikini, RMI. Result: Island blown off the face of the Earth, radioactivity caused heartache, illness, untold suffering for people, animals, earth, sky and water! Testing in USA: Similar to Bikini There should be NO testing in CNMI! The islands, marine and animal life are sacred!
A. Grajek	Submitted via Website	The people of the Marianas have lost enough land and ocean access to the military complex. They have both given and in many cases had it taken. For people who have limited natural resources every drop of ocean and every blade of grass is sacred. While the military sees our resources as training ground we see it as a life source. Please respect that.

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

S. Greenway	Submitted via Website	Pagan Island is home to many, many species of animals and plants, surrounded by beautiful corals, not to mention is inhabited by many people who will all be put at risk if the U.S. military uses this island for bombing practice. The U.S. military has a long history of treating people of color around the world like second class citizens on this planet and I for one believe the time to stop that is now. In addition, the U.S. military has plenty of training sites already in existence and should continue using the places they have already destroyed, not expanding. Also, the economic deficit of our country is still incredibly high and the military should be trying harder to be reduce their budget, not frivolously spending money on things they don't actually need. America is already viewed very unfavorably around the world for its war with Iraq to find "Weapons of mass destruction", which didn't actually exist and disregard for yet more human life isn't helping that image at all.
H. Groot	Submitted via Website	We should stop American imperialism. We have no business making bases, interfering all over the world. We are making things worse doing that! Let us take care of internal problems in the US, and most importantly: work on climate change as we are the big polluters!
C. Guerrero	Submitted via Website	I don't believe bombing Farallon de Medinilla, blowing up mines underwater and performing sonar training is such a good idea. There will be devastation for many, many years. Also, the sonar training will result in permanent hearing loss for dolphins and whales.
J. Guerrero	Submitted via Website	Due to the recent nuclear catastrophe in Japan our region is experiencing a disregard from the united nations about the long term effect that Pacific Islanders will have to burden. The health problems that the next generation will develop is being over looked once again! Our people have suffered the nuclear bomb testing in the 50s and till present day. Considered to have the highest rate of cancer per capita by health officials is evident of the consequence that the past is still present today. Only recently has pacific pigeons been reestablishing a flock on our island. With the continue destruction of their habitat the people of the Mariana's will not be able to enjoy its natural birds, it is unfair that the u.s.a get to establish a reservation in america where it's citizens can enjoy recreation our hunting and the Pacific Islander is forced by the powers of a nation to adhere as the experiment to military live fire excercise.

K. Guerrero	Submitted via Website	Thank you for presenting at UOG, However, I'm concerned about the land on my island of Guam, why use more land there when you have Hawaii and other places to train.
G. Guile	Submitted via Website	Stop thinking about destroying nature and driving people nuts on island by making this the biggest military exercising spot in the States.

Draft EIS/OEIS Comment Form

Mariana Islands Training and Testing Environmental Impact Statement / Overseas Environmental Impact Statement

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Pearl Harbor, HI 96860-3134

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [X] NO [ ] YES

Name: Alison Hadley

Organization/Affiliation: UOG, Northern Guam Soil/water Conservation District

Address:*

City, State, Zip Code:

Comments:

Thank you for being honest about effects on animals.

But this is still not a military play ground.

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M. Hardman	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
L. Harris	Submitted via Website	We have no business bombing anything in the ocean or islands any more. Time to give up the concept of thinking we can save anything by destroying! These islands are part of the earth and should not be bombed!!!
K. Hartman	Submitted via Website	The history of American imperialism in the Northern Mariana Island is a shameful one. I find it unconscionable that our government is continuing with the exploitation, cultural destruction and environmental destruction that has long characterized our relationship with the people of the Marianas. I oppose the expansion of American military use of the Northern Marianas Islands, which has already made several islands uninhabitable.
G. Herron-Coward	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands."
A. Iriarte	Submitted via Website	First of all, cannot even believe Guam isn't even an option in the state menu. AT LEAST put a divider separating the states and territories. I'm sure everyone here is tired of hearing us reiterate over again that "all lands are sacred". Does not seem to me that the American government understands this despite centuries of indigenous protests on federal government intrusion. If you take more land, then let's trade and give us Yellowstone, the Sierras, and all of Rhode Island while we're at it then we can be even. Probably never going to happen since everyone in the "mainland" would oppose it. If we are truly U.S citizens, what makes us different? Publicly, the feds would deny this, but truly, they know we are. What a sad reality and a sad state we have come to from the day this nation was founded by a truly amazing group of gentlemen.

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

N. Jain	Submitted via Website	I am extremely concerned that Pagan may be destroyed as an effect of military exercises conducted there. Pagan is home to endangered species and remnants of indigenous Chamorro villages from as long as 3,000 years ago. Please do not destroy these living beings, and the artifacts of culture and human history.
H. Johnson	Submitted via Website	Department of Defense: I urge you to cease the military build-up in the Marianas Islands. This build-up threatens biodiversity in these areas and will likely extinct several rare species of birds in the area. These species cannot be recovered. This in turn threatens the livelihood of the people who call these islands home. As a US citizen, I am concerned by the precedent that this action sets for the rest of the world, and I demand that you cease immediately. Sincerely, Hannah Johnson
A. Kaipat	Submitted via Website	I live in the Marianas. My family live here. My friends live here. I want the Guam and CNMI government, and especially DOD and the US Military, to know that I do not want our air, garden and fishing grounds poisoned. I repeat, I DO NOT WANT SONAR & BOMBING EXERCISES in the Marianas. Our islands have been bombed and polluted enough so many times over. Our people are dying from your activities! The US Military plans need to STOP! Utilize our islands for R&R or leave them BE! www.chamorro.com
C. Kaipat	Submitted via Website	CNMI is my home. Its natural resources are so delicate to its people and neighboring islands. We must keep our islands safe and free from dangerous chemicals and activities.

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Name: Cinta M. Kaipat

Organization/Affiliation: PaganWatch

Address:* P.O. Box 502914

City, State, Zip Code: Saipan, MP 96950

Comments: ① We would like to see a joint presentation of all the EIS (Divert, MITT, MIRC, JGPO & CJMT) presentations so we all can see the "Big Picture."
② We would like an opportunity to have a CPA session
③ We would like responses to our Questions published to educate others
④ How does this training in Pagan waters relate to the Marine Monument Entering these Waters near Pagan?

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

A. Kerr	Submitted via Website	I do not support expansion of the MIRC complex. I am concerned about the use of the island of Farallon de Medinilla for bombing when it is nesting site for ocean birds. Specifically, the EIS reports that FDM is an "important" nesting site for two birds, but then also says that one of these birds, the great Frigate bird, "may occasionally" nest on FDM. So what does "may occasionally" mean? five or ten birds a mating season? Or one or two every 5 years? Also, if it is an "important" nesting site for the Frigate bird, how can the EIS then say that it only "may occasionally" nest on FDM? I find this wording ambiguous, vague and unsatisfactory for fully understanding possible effects on the great frigate bird. On a separate matter, I am concerned that there could be an increase in flight activity to and from the Air Force base on Guam. Military planes regularly fly over residential civilian areas. The planes often fly at a height where the noise they generate is often disrupting to certain daily activities. It may seems like a small thing, but this noise level can temporarily disrupt the quality of conversations (in person or on the phone) as well as cause a little stress to inhabitants, from enduring the loud to deafening noise of the plane flying overhead. If military flights are to increase over civilian residential areas on any or all islands, by how much? Can you point to any studies about the well being of inhabitants subject to regular noise disruption from aircraft? Again, I oppose expansion of MIRC/MITT and remain critical of continued use of FDM for military training purposes.
J. Kerr (Guam Community College ecoWARRIORS)	Submitted via Website	The Guam Community College ecoWARRIORs, a student organization that raises awareness of environmental issues, vehemently opposes and protests the proposed expansion of the military training area. This is not only a prime example of a colonial power attempting to exert its authority, but it is also a blatant disregard for the natural resources and people of the Mariana Islands. Doubling the size of the current MIRC will increase injuries to cetaceans that live in or frequent these waters. Bombing exercises will destroy the landscape of Farallon de Medenilla. Furthermore, residents of more populated islands will be subjected to increased levels of aerial noise. If the military insists on bombing our islands and destroying our resources, soon they won't have much real estate to protect. Doubling the size of the training area is yet another example of military overkill, and no sensible reasons exist to justify this proposal. We strongly support retraction of the plans for the MITT.
S. Kessler	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to the islands, as well as the ocean and its animals, and it must stop.

S. Kim	Submitted via Website	"I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands."

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [X] NO [ ] YES

Name: ANDRE KOZIJ

Organization/Affiliation: ASIA PACIFIC ACADEMY OF SCIENCE, EDUCATION AND ENVIRONMENTAL MANAGEMENT

Address:* P.O. BOX 7527

City, State, Zip Code: SAIPAN, MP, 96950

Comments:

I WOULD LIKE TO ENQUIRE ABOUT THE POSSIBLE USE OF DEPLETED URANIUM MUNITIONS WITH RESPECT TO THE NAVAL RANGE AT FARALLON DE MEDINILLA EITHER NOW OR IN THE PAST

I CAN ALSO BE REACHED AT E-MAIL : akaspin@hotmail.com.

Visit **www.MITT-EIS.com** for project information.

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K. Kuper	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose a severe threats to our islands.

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Name: Tumona Lagstan

Organization/Affiliation: Academy Our Lady Guam

Address:* 114 Lirae Ct Latte Heights

City, State, Zip Code: Mangilao, GU 96913

Comments: I do not support the sonar b/c although it helps detect enemy ships, it affects the animals within the Marianas in a harmful way. I consider it unethical. The sound waves would cause the death of sea life such as whales.

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B. Laxon	Submitted via Website	The time and money being considered to be spent on actions that will partly or entirely destroy the ecosystem and local human environment, of these islands, would be much better spent on education, healthcare, infrastructure, etc. at home or abroad. We already have a greater military than the rest of the world combined. We do not need to test more weapons of war. Who do we need to protect ourselves against? If we can spent this money to turn our so called enemies into allies and friends no more people need to die or suffer needlessly.
J. Lee	Submitted via Website	Comment to MITT As a person that has been living on Guam for the last 20 years, I have a lot of fond memories on this island and this island has become my home for many years. I am one of many inhabitants on this island. Although I may not be Chamorro, Guam is home. I love this island and the people of Guam. Therefore, I believe that this military project will impact me because I am now part of this community. The Solar activity will not only affect me but it will affect the many inhabitants on and around this island. MITT will destroy the sea life and there is a possibility of the community being diagnosis with cancer. Like the Marshall Islands, they have been greatly impacted by the radiation from nuclear testing in the past and many individuals have been diagnosis with cancer. According to Health and Human Consequences article, it states “Cancer rates and incidence of birth defects are greatly increased in areas exposed in the radiation fallout. According to the National Cancer Institute, exposure to radiation during the atmospheric testing era resulted in an estimated 120,000 extra cases of thyroid cancer and 6,000 deaths.” Therefore, individuals will be impacted by the testing physically, psychologically, and their health will be impacted. Testing has been conducted in the past and individuals have been greatly impacted by the testing. Secondly, MITT will affect the sea life tremendously. The Earth Is being greatly impacted now compared to before, especially with Global Warming. There has been rising of sea levels, coral bleaching, and many other effects are occurring to the sea life. According to what’s The Damage, it states “The production of nuclear weapons has polluted vast amounts of soil and water at hundreds of nuclear weapons facilities all over the world. Many of the substances released, including plutonium, uranium, strontium, caesium, benzene, polychlorinated biphenyls, mercury and cyanide, are carcinogenic and/or mutagenic and remain hazardous for thousands, some for hundreds of thousands, of years.” Therefore, polluting the soil and water will greatly impact the sea life. There are more cons that can be listed but my two points are simply the major points that concern me as an individual that has made Guam her home. Reference Page "Green Peace International." Green Peace. N.p., 26 Apr 2006. Web. 18 Nov 2013. <http://www.greenpeace.org/international/en/campaigns/peace/abolish-nuclear- weapons/the-damage/>. "Nevada Desert Experience." . N.p.. Web. 18 Nov 2013. <http://www.nevadadesertexperience.org/issues/consequences.htm>.

V. Leeds	Submitted via Website	To whom it may concern, My understanding is that the Mariana Islands Training and Testing program (MITT) violates the National Environmental Policy Act and other environmental laws which have been passed by Congress. These laws are in place for a very good reason. This pristine area was once home to rare migratory birds and a plethora of sea life, now there is next to nothing able to survive there, nor will anything be able to for the foreseeable future. In addition, “Full-spectrum live-fire military exercises means year-round amphibious attacks, bombing, torpedoes, underwater mines and other detonations from the air, from the sea, and from the ground, as well as sonar training that will result in permanent hearing loss for up to 59 whales and dolphins per year, according to the Pentagon's own estimates." Please start taking better care of our planet and its inhabitants.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [✓] NO [ ] YES

Name: Victoria-Lola M. Leon Guerrero

Organization/Affiliation: Guahan Coalition for Peace and Justice / Our Islands Are Sacred

Address:*

City, State, Zip Code: Toto, Guahan

Comments: I do not support the proposed Mariana Islands Training and Testing activities. I recommend the "No Action Alternative." However, my recommendation of this alternative does not mean I support the ongoing training activities already occuring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our Islands. I did not support the MIRC when you released that EIS, and I do not support the use of our islands for war games.

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Name: Raniya Li

Organization/Affiliation: Academy of Our Lady of Guam

Address:*

City, State, Zip Code: ~~Tamuning~~ Tumon, Guam 96913

Comments: ~~Those~~ Sonar: -turned down when ~~the~~ Marine creat ~~was~~ was ~~near~~ come ~~close~~ close to the vessel
-turned off when they are really close
-for the safety of the citizens ~~as~~ as being part of the navy.
Mariana Islands on the playground for ~~the~~ testing these military equipments.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

S. Linford	Submitted via Website	Please cut back on Navy training and especially weapons testing!
L. Loe	Submitted via Website	HOW CAN THIS TRAINING AND TESTING BE PATRIOTIC? IT WILL INJURE/KILL OUR FELLOW CREATURES OF THE SEA, POLLUTE OUR AIR AND WATER, AND THE US IS NOT IN DANGER AT ALL FROM ANY OTHER ARMY OR NAVY. END THESE 'PRACTICE SESSIONS' NOW.
E. Lord	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
G. Lujan	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands and ocean; over time, threatening humanity as a whole.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Malaya

Organization/Affiliation: Our Islands Are Sacred

Address:*

City, State, Zip Code:

Comments: I do not support the proposed Mariana Islands Training & Testing activities. I recommended the "No Action Alternative". However my recommendation of this alternative does not mean I support the ongoing training activities already occuring in the Mariana Islands. The Navy's training & testing activities pose severe threats to our islands.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

T. Maxedon	Submitted via Website	Sadly, DOD's proposed expansion of MIRC represents a harmful impact to the ecosystem of the Pacific Ocean, especially in the Marianas. It is just another proposal that has fallen on deaf ears with respect to DOD's ongoing military build-up mentality in that region at all costs. Moreover, DOD's resources could be far better spent working to eliminate the various "garbage islands" floating in the Pacific and work to contain radioactive debris currently heading for US coastal regions that represents a far greater impact to the safety of US citizens. I am against any expansion of MIRC. Tom Maxedon Louisville, KY
N. Mayers	Submitted via Website	i oppose the expansion at mariana island for the ecological and environmental harm it will cause, for the buildup of yet more military threat against China, for the waste of US resources devoted to waging war. I visited Jeju Island, So.Korea, where the village culture is being destroyed and the oceans are being polluted by the construction of a US/So.Korean navy base. The pink dolphins will never more return there.
R. Medina	Submitted via Website	Please learn the history about how the natives on Guam have been impacted; they had bombs, contaminated water, loss of land and many deaths and still births, please let them be and live their natural and cultural way
J. Mendiola	Submitted via Website	PLEASE LEAVE OUR ISLAND AND OCEANS ALONE!
L. Meo	Submitted via Website	“I do not support the proposed Mariana Islands Training and Testing activities. I recommend the ‘No Action Alternative.’ However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy’s training and testing activities pose severe threats to our islands.”

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Ysa Mercado

Organization/Affiliation: Pearl 9 Productions

Address:* P.O. BOX 2035

City, State, Zip Code: Hagatña, GU, 96932

Comments: I feel like the testing is necessary to keep us safe, but if there is an even safer way to do it without causing any harm to our land & water that would be much appreciated. Of course there will be casualties but if it could be in a more controlled, safe environment it would make Guam clean. & ultimately (mostly) everyone would be happy.

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R. Miller	Submitted via Website	ES.5.2. In the EIS, it states that, "Alternative 1 reflects adjustments to the baseline activities which are necessary to support all current and proposed training and testing activities through 2020." This suggests that another EIS may have to be submitted at that time. Is there any possibility that as these EIS's continue to be submitted and the military continues to use land and sea areas that anything may be returned to the public or jurisdictions? Table ES.6-1. Section 3.1. Under the Metals section it states, "Sediments near military expended materials would contain some metals, but concentrations would be below applicable standards, regulations, and guidelines." It would be nice to know what the concentrations are, and what the standards are. Table ES.6-1. Section 3.1. Under Chemicals Other Than Explosives section it states, "Chemical, physical, or biological changes in sediment or water quality would not be detectable, and would be within existing conditions or designated uses." Again, it would be nice to see these numbers and know the levels which are not detectable. Just because something is not detectable does not mean it can't have a negative affect over a long period of time. Table ES.6-1. Section 3.3. Under the Acoustics section it states, "Most of the high-explosive military expended materials would detonate at or near the water surface. Only bottom-laid explosives could affect bottom substrate and, therefore, marine habitats." Marine habitats are not limited to bottom substrates. The open ocean is also considered a marine habitat and any explosives which are detonated at or near the water surface would affect the open ocean habitat. This needs to be addressed. It also states, "The surface area of bottom substrate affected would be a fraction of the total training and testing area available in the Study Area." While this may be true it would be important to delineate those bottom substrate areas that would be used and assess the effects on those specific bottom substrates as it may not be uniform over the entire Study Area. Soft bottom sediments were also discussed, but effects were not discussed. There are many animals and plants that inhabit soft bottoms sediments which may be affected by acoustics over soft-bottom sediments. This needs to be addressed. -Throughout the EIS there are many phrases which state that effects from certain activities are "not expected" on a certain group of animals (Example: Table ES.6-1 Section 3.4, under Acoustics). However, it does not clarify why this is stated. Is there data? If there is, it should be provided. If not, I'm not sure you can state this. Table ES.6-1 Section 3.4. Acoustics. What would be an affect that does not adversely affect marine mammals? Table ES.6-1 Section 3.4. Physical Disturbance and Strike. It is stated that "The use of seafloor devices would have no effect on any ESA-listed marine mammal." You seem very sure of this. Please supply your rationale. Table ES.6-1 Section 3.5. Acoustics. It is stated that the use of explosives will affect some species of sea turtles but not others, but provided no information as to why this is. Please expand on this and provide the rationale behind this statement. -Throughout the EIS the effects on ESA-listed species is discussed, however it is not discussed as to what affects

		any of this training or testing will have on other marine species. Why is this? Why were only ESA-listed, or those proposed to be listed, considered in this EIS? Table ES.6-1 Section 3.6. Secondary. It is stated that, "Pursuant to the MBTA and 50 C.F.R. Part 21.15, these impacts will not cause significant adverse effects to populations of bird species not ESA listed and otherwise protected under the MBTA." How much of a population needs to be destroyed or affected before it has a significant adverse effect to the population? I think the goal should be not to reach that point, but to set the standards lower so that when we start to see a small affect, we can stop before it reaches a significant adverse effect to the population. Table ES.6-1 Section 3.10. Physical. Wildfires are mentioned for the first time here as affecting terrestrial species and habitats. Wildfires also have a secondary affect to coral reefs and should also be mentioned and analyzed in the marine invertebrates section. ES 7.4. How much monitoring will be done for the purposes of this project? In the past data that has been collected by the Navy seem to not be readily available to those who need it, and sometimes available only after an action has been carried out. It would be nice to see the protocols and know how the monitoring activities will be completed, and to get updates on progress as the monitoring goes along.
R. Miller	Submitted via Website	Section 2. Training and testing has historically occurred in the MITT Study Area, however there has never been any EIS before to determine the effects. Is there any way to know how the training and testing has affected habitats already? 3.0.4.1.6.1. "There are in-water active acoustic sources with narrow beam widths, downward directed transmissions, short pulse lengths, frequencies above known hearing ranges, low source levels, or some combination of these factors, that are not anticipated to result in takes of protected species and therefore are not required to be quantitatively analyzed." So, if a species is not protected, it does not require quantitative analysis? Is there any qualitative analysis that has been done? I think that those species which aren't listed should also be analyzed. Also, a behavioral risk function equation was given, but no source for this equation. Where did this come from and how is it applicable to this analysis? -Decibel levels are listed throughout the EIS. It would be nice if there was a list of dB levels, and what they are comparable to for reference. Also, it would be nice to get each species listed with dB levels next to them to see how it all compares. 3.0.4.1.6.2. "The source is expected to result in responses which are short term and inconsequential….." Even if a source is expected to result in responses which are short term, they should not be deemed inconsequential due to the fact that short term effects accumulated over the long term can become long term adverse effects. Table 3.0-5, Small Impulsive Sources. It states that there was quantitative modeling in multiple locations, however it does not list the locations. Do these locations correspond or have any resemblance with what it may be like in Guam, or the Marianas? Best to go from that data. -It would be nice to get the

		defined difference between training and testing. Are they essentially the same thing? Why are they separated. Table 3.0-8, Mid-Frequency, MF-1 & MF-4. Under Alternative 1, it seems that there are less sources than in the No Action Alternative. How/why is that? 3.0.5.2.1.1. Mine Warfare Sonar. "Mine detection sonar use would be concentrated in areas where practice mines are deployed, typically in water depths less than200 ft. (61 m)." Is this open ocean depth 200 ft., or is this bottom depth of 200 ft.? Some corals can still grow down to 200 ft., so it would be good to know how coral affects were accounted for at this depth with the use of Mine Warfare Sonar. 3.0.5.2.1.5. "In an attempt to determine traffic patterns for Navy and non-Navy vessels, the Center for Naval Analysis (Mintz and Parker 2006) conducted a review of historic data for commercial vessels, coastal shipping patterns, and Navy vessels along the east and west coasts." What would this be for Guam? Since this is proposed in Guam you should be using numbers for Guam and the CNMI. 3.0.5.2.3.3. "Certain devices do not have a realistic potential to strike living marine resources because they either move slowly through the water column (e.g., most unmanned undersurface vehicles) or are closely monitored by observers manning the towing platform (e.g., most towed devices)." How does moving slowly prevent you from having a realistic potential to strike a living marine resource? Are these vehicles controlled by someone that can see and avoid living marine resources? And how slow is "slowly moving"? 3.1.3.1.2. "When it functions properly (i.e., complete detonation), 99.997 percent of the explosive is converted to inorganic compounds." How often does it not function properly? 3.8.3.1. "Sonar is not used in areas where corals proposed for ESA listing are known to occur." Was it not stated that Sonar would be used port-side? There may be corals under the proposed listing which are present in Apra harbor and inner Apra harbor. Need to check on that, before you can make this statement. "Because research on the consequences of exposing marine invertebrates to anthropogenic sounds is limited, qualitative analyses described below were conducted to determine the effects of the following acoustic stressors on marine invertebrates within the Study Area:….." Quantitative analyses still need to be conducted before you can say for sure what the effects are. 3.8.3.1.1.1. "There is no evidence that corals or coral larvae are sensitive to distant non-impulse sounds." Is there evidence that they aren't sensitive to distant non-impulse sounds? Just because there is no evidence does not necessarily mean you can take that for fact.

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

D. Mitchell	Submitted via Website	As a semi-retired, Pulitzer Prize-winning newspaper editor and publisher, I am fairly conversant with government policy and environmental issues, and I find the proposed Mariana Islands training-and-testing proposal to be an ethical and ecological disaster. If Pagan and other Mariana islands, as well as the open ocean, were subjected to heavy bombing and artillery fire, the marine ecosystem could not ever recover. The proposal would violate NEPA and a host of US environmental-protection laws. If it were carried out, the United States in future years would have to hang its head in shame for having been so shortsighted. The permanent damage will be remembered as equivalent to the mindless destruction of the ancient world's Great Library of Alexandria. The environmental damage certainly will not make any of us proud to be Americans. Rather, it will reinforce the belief of domestic terrorists and our enemies that anti-US violence may on occasion be warranted. In short, the proposed training and testing site will make this country less safe.
M. Moniz	Submitted via Website	I do not support any military exercises in the CNMI. Unless the Feds are willing to pay for COFA migrants to get adequate health care and social services for the health problems and social disparity that were caused by them being displaced by the US, then no way. Enough already.
S. Murphy	Submitted via Website	No action. I do not want to see military training continued in the Marianas. Please find a place in the US mainland to practice war.
J. Nangauta	Submitted via Website	Håfa Adai ginen Guåhan, AHE! NO! I do not agree or accept training in the Mariåna Islands! Not the current training happening, nor the proposed action to use sonar, guns and munitions in the ocean, land, and air that surounds our islands. We must find ways to sustain our future generations of the WORLD without war games and violence that furthur degrade the earth and all living beings. We are the earth. The health of the land is the health of the people, ALL PEOPLE. Seek Peace, understanding & forgiveness with all mankind, we all bleed the same blood. We are ONE, With the earth, the sun, the moon, the skies, the animals, and the plants. It is obvious that the US Gov. intends to spread out across the globe, putfabot!(please) be a better stewart to the earth we live on. The US is the leading country of the world contributing to the nuclear contamination of the Environment along side Japan in recent times regarding Fukushima. No living being is spared from the ails of nuclear contamination. If we could possibly prevent such degradation to our homeland by standing up against this MITT proposal then we must do all we can to protect the Mariånas from furthur destruction. Its our duty to our sainas (ancestors) and the people who come before, tao tao mo'na.

		Allow indigenous people rights to live free on their homelands and decide their own fate. You want to be a good humanitarian and help the world as you like to portray then please! Clean the sites up from previous war activities on our islands and the islands that surround us! Guam - Cocos Lagoon, Anderson Airforce Base, Barrigada Storage Facility, Sumay, GabGab, Tinian, FDM, Bikini Atoll, Kwajalen Atoll, Enewetak, Belau. Our islands are also being protected by the Common Wealth Constitution in Article XIV NATURAL RESOURCES: "Section 1: Marine Resources. The marine resources in waters off the coast of the Commonwealth over which the Commonwealth now or hereafter may have any jurisdiction under United States law shall be managed, controlled, protected and preserved by the legislature for the benefit of the people. Source: Original provision, unaltered (ratified 1977, effective 1978). Section 2: Uninhabited Islands. The island of Managaha shall be maintained as an uninhabited place and used only for cultural and recreational purposes. The islands of Maug, Uracas, Asuncion, Guguan and other islands specified by law shall be maintained as uninhabited places and used only for the preservation and protection of natural resources, including but not limited to bird, wildlife and plant species. Source: Original provision (ratified 1977, effective 1978); amended by Second Const. Conv. Amend. 37 (1985). Section 3: Places and Things of Cultural and Historical Significance. Places of importance to the culture, traditions and history of the people of the Northern Mariana Islands shall be protected and preserved and public access to these places shall be maintained as provided by law. Artifacts and other things of cultural or historical significance shall be protected, preserved and maintained in the Commonwealth as provided by law. Source: Original provision, unaltered (ratified 1977, effective 1978)." Our home is a sacred place to us where the plants and fish and birds have sustained our people for these THOUSANDS of years.DO NOT CONTINUE TO DESTROY THE SACREDNESS OF OUR ISLANDS. Do good and serve ALL equivalently.
F. Naputi	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

J. Newland	Submitted via Website	To Whom It May Concern: I am writing this comment in order to put forth my recommendation that the United States Government, and the Department of the Navy, choose the "no action alternative" in regards to the EIS/OEIS generated for the Mariana Islands Training and Testing (MITT) Study Area. In my opinion the U.S. Navy should figure a way in which to work within the already existing MITT Site, the largest Department of Defense training site in the world. The Department of Defense manages approximately 29 million acres, it seems that there would be a considerable amount of land that could be used in lieu of the Mariana Islands, areas of considerable ecological and social value. As a combat veteran myself, I do understand the need for a force to maintain a readiness level that includes job proficiency through real-life training scenarios, as well as the necessity to test and develop new weaponry. As a university senior studying environmental science and biology, I feel there is considerable reason for the Navy to modify its stance in regards to the Migratory Bird Treaty Act and the Marine Mammal Protection Act. During my time in school I have taken many relevant courses in environmental science, ecology, biology, conservation and environmental impact statement evaluation, to name a few. I believe it is in the best interest of the United States military to pursue a more circumspect attitude towards the environment and especially towards delicate and complex ecosystems such as those found in the Mariana Island region. Signed Jesse Newland jnewlan2@msudenver.edu
G. Nucum (Okkodo High School Fish Club [Marine Biology])	Submitted via Website	Expanded MITT activities would critically disturb the already delicate balance between our environmental and military interests. The negative impact on marine life and habitats is too great a price to pay for what relatively less valuable benefit gained from needlessly expanding a military operation already present in the area.
C. Onedera	Submitted via Website	I do not support the expansion of the MIRC beyond its current footprint nor do I support an increase in the military training in this region.

Draft EIS/OEIS Comment Form

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You may submit your comments by:
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2) Mailing this form to:

Naval Facilities Engineering Command Pacific
Attention: MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

3) Completing the online comment form at **www.MITT-EIS.com**.

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [✓] NO [ ] YES

Name: Sharlene T Ooka

Organization/Affiliation:

Address:* 106 Bernardo Road

City, State, Zip Code: Yona, Guam 96915

Comments: "I do not support the proposed Mariana Islands Training and Testing activities. I recommend the NO Action Alternative. However, my recommendation of this alternative does not mean I support the ongoing training activities already occuring in the Mariana Islands. The Navy's training and Testing activities pose severe threats to our Islands.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: SHARENA OOKA

Organization/Affiliation:

Address:* 106 BERNARDO ROAD

City, State, Zip Code: YONA, GUAM 96915

Comments: I do not support the proposed Mariana Islands training and testing activities. I recommend the NO Action Alternative. However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

J. Palma-Glennie	Submitted via Website	Aloha, It's brought me to tears to hear that the United States of America, in 2013, would even consider using a place as spectacular as the Mariana Islands for weapons training. As we say in Hawai`i, auwe (shame and sadness). Because the Mariana Islands, located in the western Pacific, are nowhere near as renowned as the Galapagos, the U.S. military has been conducting full-spectrum live-fire training on the island of Farallon de Medinilla, as well as over a half-million square miles of the open Pacific, wreaking death and suffering to all marine life. to rename this bioregion the "Mariana Islands Range Complex" (MIRC) is callous beyond belief. Since the imposition of the MIRC in 2010, Farallon de Medinilla, once teeming with amazing sea life and rare migratory birds, has been bombed and disfigured. thank you for consideration of my views on this most critical matter. please stop this travesty. please stop the militarization of the pacific and our world. what will be left for our children's children to sustain their lives environmentally, culturally, and spiritually.
S. Palomo	Submitted via Website	I am opposed to any more military activities in the Mariana Islands. The Mariana Islands has a history and culture of over 4,000 years. The island chain is becoming a militarized zone with added restrictions to the waters surrounding the island chain. The United Nation's Declaration of Indigenous People's Rights must be adhered to, including the indigenous people of the Mariana Islands.
J. Pangelinan	Submitted via Website	The footprint of the United States Military in our region is already substantial. There is no need for a testing zone this large in such a pristine environment. Undersea and on land live fire is unnecessary here in the Marianas when there are already existing facilities in the nation that are prepared to handle these activities. In other words, Keep the bombs out of our back yard.
J. Patzek	Submitted via Website	This is insanity. Why would you risk the lives of all the plants and animals for unnecessary military training?! What does this teach our children? That lying absolute waste to Mother Nature is OK in any circumstance? Please adhere to the environmental laws that were put in place. Conserve the little amount of pristine habitat that we have left on Earth.
R. Pedano	Submitted via Website	"I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands."

P. Pelayo	Submitted via Website	From what I can understand, the test will affect animals such as the turtles. My question is there a back up plan to replenish the turtles that will potentially get killed from the testing?
M. Pena	Submitted via Website	Would there be any protection for the marine birds and invertebrates that are not protected under the Endangered Species Act?
N. Pereda	Submitted via Website	Hafa adai, I am against the DoD's plans to expand the MIRC and MITT. Issues and facts: 1. The MIRC is the largest DOD range in the world. It spans 501,873 nautical miles of ocean and is 3 times larger than California. 2. The MITT would nearly double the ocean covered under the MIRC, expanding the range of DOD training to 984,469 square nautical miles. The MITT would be larger than the states of Washington, Oregon, California, Idaho, Nevada, Arizona, Montana, and New Mexico combined. Comment: If MIRC is already the largest DOD range in the world there should be no reason to expand. Unless DoD presents legitimate reasons for what appears to be just want of excess or just plain greedy. Should DoD need more space for training it should consider a large portion of the US's mass continent waters first. 3. Under the MIRC/MITT, DOD will bomb Farallon de Medinilla, blow up mines under water and perform sonar training. 4.The use of sonar training will result in permanent hearing loss for up to 59 whales and dolphins per year. (MITT, Vol. 1, p. 3.4-114) Comment: These activities will destroy what is a pristine and unique ecosystem and an important part of the history of the Mariana Islands. The US government has been a forerunner for establishing wildlife and marine preserves as sanctuaries and for the protection of unique species, especially on Guam. It is contradictory for the US's DoD to continue with these plans or to have even suggested it. This may seem like a trivial matter to the DoD (who live far away in comfort) but if the northern islands ecosystem suffers it will affect the rest of us as well. So please do not expand the training grounds any further. Saina ma'ase, nathalie
F. Perez	Submitted via Website	The military should really think about practicing in a different way. The live ammunition is really going to affect our sea life. Lots of dolphins and whales are going to be killed in the process and Guam doesn't always see a lot of them. Even if they only lose their hearing, they need their hearing to survive. This is going to affect their ability to live. I'm sure there's a safer way to approach this. It's imperative that our military is training, but it's also important that we protect our sea life.

J. Perez	Submitted via Website	I think readiness and training is essential to ensure military forces are ready for a host of low to high end contingencies that may arise in Northeast Asia and the East Asia regions. I do think that active sonar is also needed to search for diesel powered submarines owned by the Chinese military that can hide in the littorals. I am concerned about three things. First, small arms and other kinds of firing ranges are being proposed on Guam that will introduce spent rounds into the surround areas that may be deemed for live fire range use. Who is going to clean up and remediate the rounds that have been fired from land and introduced into the surrounding waters off of Andersen? I think the Navy E&I community and the Marine Corps presence to be placed on Guam must establish and execute on a remediation program that extracts these man made objects from the surrounding sea areas. I have not heard of another area in the U.S. that allows for this kind of training to take place. Also, I am concerned about sonar activities and the impacts that this will have towards marine life. I do not think sonar exercises should take place anywhere near the MIRC because it will result in whales and other marine creatures to beach on Guam's reefs. This has happened more than a couple of times over the years. I recommend that sonar activities take place hundreds of miles of the MIRC coastal areas and that they be strictly enforced in terms of impacts to the surrounding marine environment. My last comment is that military readiness training, research and testing of new vessels such as the LCS, VA class submarines, SEAL UDV's and other kinds of military assets should compete or impinge upon the activities that local fisherman must embark upon to go fishing throughout the area designated by the MIRC and the MITT area. The local fishing community should not be unduly restricted to their livelihoods because of an overwhelming military readiness requirement. There is plenty of room for everyone to use the surrounding waters that comprise the MIRC and the MITT. I understand the need for this training area but I do not want to see this pristine area become a military training area if it will compromise the marine environment and impinge on local needs to use the surrounding waters and to prevent the introduction of spent rounds into an otherwise clean area. Please take into consideration these comments for planning purposes.

December 8, 2013

Naval Facilities Engineering Command, Pacific
Attention: MITT EIS/OEIS Project Manager
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

Dear Sir or Madam:

I am writing in opposition to the proposed expansion of training activities outlined in the Mariana Islands Training and Testing (MITT) EIS. The Northern Mariana Islands host endangered birds, which are living in a pristine habitat. Many of these birds once existed on Guam, but they have become extinct since the 1980s. The cause of their extinction is the importation of the Brown tree snake through military planes. It is essential to point out that the military training proposed in the MITT activities will not only put our native wildlife in harm's way but it will accelerate the rate of harm of our land and marine species. Expansion of the Mariana Island Range Complex to 984,469 square nautical miles, use of sonar at levels that will cause permanent hearing loss to our whales and dolphins, bombing of Farallon de Medinilla and other unknown target sites within the proposed MITT areas are a huge assault on nature that calls this area home and the ecosystem that supports life. The proposed activities are in direct violation of the Endangered Species Act and Marine Mammal Protection Act.

Secondly, the effects of technology on human life have not been adequately examined. The lack of transparency once put into effect will create the largest human experiment, in which the residents in the adjacent Pacific islands will be the unwitting and uninformed subjects. This is in direct violation of 50 USC S1520a and other laws prohibiting human experimentation.

Thirdly, the disproportionate burden placed on Pacific islanders for the protection of the United States proper is an environmental injustice. Moreover, this proposal is counter to the mission of the United States as a protectorate of Guam, as defined by the United Nations. The United Nations Charter states that the United States of America, as the administering power for Guam, is to protect "the interests of those inhabitants of the territories whose peoples have not yet attained a full measure of self-government as paramount." The UN Resolution 1514 further states "any attempt at partial or total disruption of the national unity and territorial integrity of a country is incompatible with the purposes and principles of the Charter of the United Nations." The proposed MITT activities are a disruption of our natural resources that we depend upon culturally, economically, and environmentally.

I appreciate that you take these concerns under serious consideration. I intend to follow-up with any of my grave concerns regarding the proposals under the Mariana Islands Testing and Training and the Mariana Islands Range Complex.

Sincerely,

Sabina Perez

Sabina Perez
Guam Resident

Z. Perez	Submitted via Website	Though I fully understand the need for the MITT, as a Chamorro I must state my objection to the use of our most precious natural resource. More specific is the effect the MITT will have on our oceans marine vegetation (3.7). First is why were only six major taxonomic groups studied. There must surely be additional vegetation that will also be affected by this training area. Section 3.7.1 states that "Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act are described in the Essential Fish Habitat Assessment (EFHA)". Why was a copy of this EFHA not provided with the EIS so we can further study the effects on all vegetation. Section 3.7.2 states that "Marine ecosystems depend almost entirely on the energy produced by marine vegetation through photosynthesis, which is the transformation of the sun's energy into chemical energy. In the lighted surface waters of the open ocean and coastal waters, marine algae and flowering plants provide oxygen, food, and habitat for many organisms in addition to forming the base of the marine food web". If this in fact true then how can I as a Chamorro allow the approval of this training area. 3.7.3.1.1.2 Alternative 1, Testing Activities, clearly states that "underwater explosions conducted for testing activities may injure or kill individual marine plants". It also speaks of the impacts of explosions that exceed natural disturbance intensities may uproot plants and damage substrates, which would delay recovery. As I continue to read through the section I notice the phrase "recovery is likely", will using areas already affected by the training techniques truly minimize the impact on Marine Vegetation or is this something we are hoping for?

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [✓] NO [ ] YES

Name: Kimberly Pinaula

Organization/Affiliation: University of Guam Student

Address:* PO Box 5367 Mangilao,

City, State, Zip Code: Mangilao, GU 96923

Comments: The presenters were able to provide very useful info on their cause, however, I still feel like the testing of new weapons, technologies, equipment could still very much harm our islands. I understand that in order for our islands to be protected, the US military should be able to utilize their equipment effectively. I just wish our islands didn't have to be exposed to any more test like these. Our islands suffered so much over several decades and if in any way the community agrees to the test, I just hope that [redacted] are not affected.
the beauty of islands

Visit **www.MITT-EIS.com** for project information.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

J. Pineda (Electronic)	Within in the MITT Statement booklet that was passed out, I noticed the following, "Training and Testing of Explosives". Does that mean that Biochemical weapons will be used? If so, to what extent? With that, under the Environmental Resources section "...activities could result in local, short and long-term changes..." seem to be very prevalent in all the paragraphs. Considering that the marine life on Guam is very fragile, even if it was some how proven, "...chemical, physical or biological changes would not be detectable; would be below applicable standards..." what standards is being followed? Considering that history has proven that such things that were, "...not...detectable; would be below applicable" have proven in the future that it was the reason for such a breakdown (i.e. agent orange). Are alternatives set in place if it were to arise or will a mollified action be used?
L. Puyat (Electronic)	I oppose military plans to militarize our islands. We have lived on our islands for thousands of years and am against destruction and degradation of the environment of our islands. We want to preserve the land and sea for future generations. I advocate for the no action alternative and oppose the current testing and training in the Marianas. #OurIslandsAreSacred #SavePaganIsland

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Pearl Harbor, HI 96860-3134

3) Completing the online comment form at **www.MITT-EIS.com**.

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Abby Duenchco

Organization/Affiliation:

Address:* P.O. Box 867 ~~Hagatna GU~~

City, State, Zip Code: Hagatna GU 96932

Comments: How do you plan to recreate what you have destroyed on FSM? ~~The Island of Tinian~~ is How are the marine animals being saved? I disagree with ~~the~~ expanding the military training area.

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*Provide your mailing address to receive future notices about the Mariana Islands Training and Testing EIS/OEIS.

Draft EIS/OEIS Comment Form

Mariana Islands Training and Testing
Environmental Impact Statement /
Overseas Environmental Impact Statement

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [X] NO [ ] YES

Name: Nichole Quintanilla

Organization/Affiliation:

Address:* P.O. Box 1033 Hagåtna

City, State, Zip Code: Hagåtña Guam 96932

Comments: I do not support the proposed Mariana Islands Training and Testing activities. I [redacted] recommend the "No Action Alternative." However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands." If we allow ANYBODY to use our homes →

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*Provide your mailing address to receive future notices about the Mariana Islands Training and Testing EIS/OEIS.

B. Ramos	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
B. Ramos	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
K. Reyes	Submitted via Website	I don't think that the Navy should employ the use of high frequency sonar testing or long-range sonar in the area which was recently designated as a national marine monument, nor in the waters around these islands unless they deem that there are no problematic effects of the sonar to the marine mammals, especially cetaceans, and no harmful effects to other organisms who may depend upon sonar for their livelihood. It is well-known that cetaceans and dolphins have been washing up on the shores of these islands recently much more than they did in the past, many are already dead when they do. Even recently, there have been dead false killer whales (an endangered species and protected by the federal government) washing up in Hawaii where there is also military sonar being used, and in California. I don't think this is a coincidence. These animals cannot be guinea pigs where we do the testing first and see later if they die. They must be protected, and I am sure our navy can use sonar in the parts of the world where there are no endangered cetaceans passing through or making their home. This is not a ridiculous request coming from a native to these islands who has an intense interest and passion in the marine life surrounding my islands. My future career depends on these animals being taken care of, and in studying these organisms and I don't want to not be able to because of a degradation of the food chain from it being disrupted by top predators being killed by sonar. Thank you.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [✓] NO [ ] YES

Name: Maia Pauline Reyes

Organization/Affiliation:

Address:*

City, State, Zip Code:

Comments: The Mariana Islands Training and Testing ~~as~~ will not be supported by me. I acknowledge that my recommendation of "No Action Alternative" does not exactly mean that I support the training activities already happening in the Marianas. Nevertheless, I believe that the possible training and testing of the Navy ~~as~~ may pose severe threats to our islands.

Visit **www.MITT-EIS.com** for project information.

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Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

R. Ridge	Submitted via Website	As an ecologist, I would respectfully urge you not to devastate any of the Mariana Islands for training purposes. The diversity and richness of natural life there should not be subject to warlike activities. In the strongest terms, I urge you to protect and not destroy this environment. Sincerely, Russell Ridge Retired Professor of Biology College of Marin, Kentfield, CA
C. Roane	Submitted via Website	The expansion of the training in the Marianas is horrifying. Navy sonar disrupts marine animal foraging, causes hearing loss, and fatally injures whales. The Navy itself estimates that expanded training activities would cause 59 whales and dolphins to suffer permanent hearing damage every year. Other impacts include those on sea turtles, fish, marine habitat, and the Mariana Trench Marine National Monument. Environmental activists say the exercises would violate the National Environmental Policy Act and other US environmental laws. In addition, Pagan is culturally important, anthropologically important, says Dr. Michael Hadfield, a zoology professor at the University of Hawaii. “[And] when the military takes an island for live-fire training, they destroy it.” I'm with Dr. Hadfield and respectfully request that the US Navy stops this wrong-headed expansion before more life and cultural heritage is needlessly destroyed.
N. Sanchez	Submitted via Website	As a native resident, I am deeply concerned about the terminal damage the build-up will have on my environment. As a tropical island, Guam is home to many different species of sea life. Tourism is one of Guam's most vital sources of income and many tourists come to Guam to experience our oceans. Section 3.5 states "the use of sonar and other active acoustic sources may affect and is likely to adversely affect ESA- listed green, hawksbill, loggerhead, and leatherback sea turtles." Also, section 3.93.1.1.1 states, " the shock wave from an underwater explosive is lethal to fish at close range, causing massive organ and tissue damage and internal bleeding." Then again in section 3.7, it states, "underwater explosives could affect marine vegetation by destroying individual plaints or damaging parts of plants." This will have a negative impact on our tourism industry thus a negative impact on our economy.

Draft EIS/OEIS Comment Form

Mariana Islands Training and Testing
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Pearl Harbor, HI 96860-3134

3) Completing the online comment form at **www.MITT-EIS.com**.

4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [X] NO ~~[X] YES~~ F.S.

Name: Fu'una Sanz

Organization/Affiliation: University of Guam

Address:* P.O. Box 22643 Hagatna, GU 96932

City, State, Zip Code:

Comments: I am against the proposed Mariana Islands Training & Testing activities. I prefer the 'No Action Alternative.' However, my recommendation of this alternative doesn't mean I support the ongoing training activities already occuring in my home, the Mariana Islands. The Navy's training & testing activities endanger & threat our beautiful islands.

Visit **www.MITT-EIS.com** for project information.

*Provide your mailing address to receive future notices about the Mariana Islands Training and Testing EIS/OEIS.

D. Searway	Submitted via Website	I am very sorry to hear all of this! It seems the story is always the same with a dis regard for the natural world,animals, other life forms and the original peoples.Our new base on an island off from south Korea is another tragic example.
K. Seas	Submitted via Website	I oppose any additional military testing/bombing/etc. in the Mariana Islands vicinity. As someone who lived there for two years and have travelled the world extensively, I understand the unique beauty of the area, and its untouched nature. If the military needs more area for testing/bombing, I suggest they find someplace already damaged upon which to bomb/test, rather than destroy what little untouched beauty is left on the earth.
F. lksjflksj sfkjlsfjlksjf	Submitted via Website	I advocate for the no action alternative and oppose the current training and testing in the Marianas.

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4) Do you wish to withhold your name and address from public review or from disclosure under the Freedom of Information Act (FOIA)? [ ] NO [ ] YES

Name: Kiara M. Sinlao

Organization/Affiliation: ADLG

Address:* 150 Rizal St.

City, State, Zip Code: NCS, Dededo, 96929

Comments: The topic that interested me was how the sonar helps out the U.S. with detecting enemy ships, however it affects the animals which harm them because of the sound waves. which is considered one of the contributing factors as to why animals are ~~affect~~ harmed.

Visit **www.MITT-EIS.com** for project information.

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Against the use of large explosive device at Farallon de Medinilla Target Range (FDM)

With imaging and surveillance technology available today, it should not be necessary to use heavy ordinance to assess the effectiveness of a pilot/bombardier or mariner's ability to place a bomb or missile on the target. It is not necessary to have a "Big Boom" to know whether ordinance has been skillfully placed on target or fallen widely from their intended target.

From speaking with Dept. of Fish and Wildlife personnel, I understand FDM is home to as many as thirty-five endangered megapode birds, with large seabird colonies as well. The island is only 200 to 300 square acres. Detonating a single 900kg bomb, on this small island could destroy most of the terrestrial life on the island, assuming a 280M radius of lethality.

As far as small arms fire, grenades, and small <1kg explosive devices, what care can be taken to minimize disruption to the terrestrial life there? Are the soldiers and air-assault teams informed of the endangered species on the island? Policy and procedures should include minimization of impacts outside of the immediate mission location on FDM.

Given that environmentalists and politicians have closed important training ranges at Kaho'olawe and Vieques Islands, doesn't it behoove the DOD policy makers not to draw the ire of these constituents to FDM?

Please explain to the public why large heavy ordinance must be used on FDM, instead of missiles or other bombs with inert or dummy warheads?

If it is possible, to change the ordinance payloads, why not do it? At least give the public the reason why large explosive payloads must be used instead of inert warheads and bombs, with the generalized "military readiness" argument.

The DOD officials will encourage acts of political pressure, legal challenges, and civil disobedience, if they will not modify their practices. Think real hard and remember what happened with Kaho'olawe and Vieques ranges, and other mainland U.S. and off-shore training grounds--don't lose FDM due to recklessness.

Do the right thing, and keep the explosive sizes to a minimum.

Submitted:

Arthur Sondheim

K. Suarez	Submitted via Website	I prefer the NO action alternative
L. Suidan	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
A. Suni	Submitted via Website	Please stop this project! I have friends who live on the Island of Saipan who will be extremely negatively impacted by this project. Please take these tests and trainings elsewhere where they will not negatively impact the inhabitants of these Islands.
S. Symes	Submitted via Website	I am totally AGAINST MITT especially as how the MITT would violate the National Environmental Policy Act and other environmental laws passed by Congress!!!! PLEASE do NOT continue with this, you are violating the very laws that were passed to SAVE the environment in this incredible, beautiful bio-diverse place!!!
A. Taimanglo	Submitted via Website	Simply put, I do not support increased military testing, nor do I support the 'No Action' alternative. It is evident that there will be severe consequences that will negatively affect our environment, animals and our people. As the draft states, "The shock wave from an underwater explosion is lethal to fish at close range, causing massive organ and tissue damage and internal bleeding"(3.9.3.1.1.1) Another point outlined in the draft states "….the use of sonar and other active acoustic sources may affect and is likely to affect ESA- listed green, hawksbill, loggerhead, and leatherback sea turtles" (3.5) The list of potential threats goes on and the cons seem to outweigh the pros. The objective of the proposed action is to deter aggression and maintain freedom of the seas. The irony of this objective is that the agenda of the proposed action is grounded in aggression and increasing military testing in within our region would rob our environment, animals and people of this very freedom you seek to maintain. I would hate to see the depletion of our islands all because of a theoretical war that you must prepare for. Please consider the injustices that are outlined in the draft and how the people who call these islands home will be affected. With extreme sincerity, please do not sever our connection with the sea. I hope the sanctity of our islands will take precedence over the

		explosives, sonar and contaminants meant to sustain our freedom. Please do not destroy my home. Source: Navy Facilities Engineering Command, MITT EIS/OEIS Project Manager. (2013). Mariana islands training and testing activities draft environmental impact statement/overseas environmental impact st a tem e n t. Retrieved from website: http://mitt-eis.com/Portals/MITTEIS/files/draft_eis/MITT DEIS_v4_0.1a_Title_Page-Inside_Volume_I_4 September 2013.pdf
L. Taitano	Submitted via Website	Please leave our Islands and Ocean alone! We already have issues with our environment---why add to it by blowing up mines underwater and performing sonar training. We don't plan to go anywhere else---this is our island and we will find ways to protect it.
S. Teulilo	Submitted via Website	Thank you for your time, I believe you all know what the right decision is.
M. Teulilo	Submitted via Website	Our Islands are sacred and we do not need anymore military bases. Save Pagan!! GIVE US BACK OUR ISLANDS!!!
M. Thielk	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.'
A. Thorpe	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands

Written Comment(s) on MITT Draft Environmental Impact Statement
September 2013

E. Toves	Submitted via Website	I understand that testing new technology or giving proper training is appropriate in order for the military to be properly prepared for various types of situations. However, as shown by information displayed on the MITT website, "The Mariana Islands are an ideal setting for military training and testing activities because of their location in the Indo-Asia-Pacific region. The islands and the surrounding air and sea space have provided the United States (U.S.) military with a safe training and testing environment for decades." If the MIRC already provides "a safe training and testing environment," then there is no need to provide more space to increase safety. If expansion is to increase productivity of the MIRC, a description of the MIRC's attributes, shown by the website, "Expansive airspace, surface sea space, and underwater sea space," states that the space of the MIRC is "expansive". If the space is expansive, then why would it need to be increased? Clearly, the expansive space is not being used to optimal levels. Also, if losses can be estimated, as shown by this statement, "The use of sonar training will result in permanent hearing loss for up to 59 whales and dolphins per year." (MITT, Vol. 1, p.3.4-144), then why can't it be prevented. New technology is supposed to be tested in the area, but if technology can't even prevent negative impacts, what good can the new technology even do?
L. Toves	Submitted via Website	First of all, I am against the use of active sonar in our waters. According to the Scientific American, sound waves can travel for hundreds of miles under water, and can retain an intensity of 140 decibels as far as 300 miles from their source (John Slocum). If these sonar activities can kill our marine life, what more our divers? Divers exposed to high levels of underwater sound can suffer from dizziness, hearing damage or other injuries to other sensitive organs, depending on the frequency and intensity of the sound according, to The Diving Medical Advisory Committee. Second of all, I do not agree with the military taking away our land just so they can continue their training and testing. Our islands are sacred! They are slowly taking away what was once our identity. The military is supposed to do what's right not what's wrong! I feel as if they do not care about our island and our people and how this will affect the people of these islands.

D. Tugaga	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
D. Tugaga	Submitted via Website	I do not support the militarization of the Mariana/Micronesian Islands! Our Islands are Sacred, and we are still living. Our islands are our homelands, where our stories are held, our ancestors are buried, our way of life is valued and practiced. Please help us take care of our homes, and not destroy it. We are still alive, and so will our future generations. Please help us help our people. Only in solidarity can we honor our communities and our cultures, not destruction.
M. Tuncap	Submitted via Website	My name is Michael Tuncap and I was born in Tamuning in 1979. My father served in the US Air Force for 17 years and 19 years in the US Postal Service. My mother served as a para educator in public schools in Guam and Washington state for 36 years. I have served as a teacher and counselor for public colleges for 15 years. We are proud to be Chamorro from the island of Guam and we speak out against the proposal to take over Pagan. I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
P. Turner	Submitted via Website	I'm submitting this comment to ask that the Pentagon and specifically the Navy, not do live fire exercises in Marianas Islands. While I understand the military's needs to do live fire exercises, the types of exercises that you intend to conduct in the Marianas Islands can be done in less pristine areas. There are many places throughout the U.S. and its territories that are significantly less pristine than the Marianas Islands. Why not choose those places. Clearly we have Air Forces weapons ranges that are within reach of carrier launch aircraft. Why do you need an island? What potential foe for the foreseeable future is an island nation?
D. Vice	Submitted via Website	The continued growth of DoD activities in the mariana islands is placing considerable strain upon natural resources without adequate analysis of the cumulative effects of said growth. While each EIS developed is presented to the public as a stand alone project, the simple fact remains that it is virtually impossible for anyone to make any real analysis of the overall impacts to the region, as the documents generated are simply too cumbersome for anyone to fully understand, and they consistently fail to connect the pieces into a single bigger picture for DoD actions in the region - by failing to consolidate all reasonably foreseeable actions into single NEPA documents, DoD is failing in a fundamental principle of federal environmental law. This EIS fails (again) to provide any real

		analysis of the impacts DoD activities have upon sport fishing in the Marianas. Significant important chunks of sea mounts, banks and offshore ocean environments will be restricted under the preferred alternative, and coupled with the pending Guam Build-Up SEIS, where Ritidian Point will be considered the preferred firing range alternative, will even further erode the ability of fishermen in the region to pursue their legal activities in an ocean not owned by the DoD. This is simply unacceptable from the fishing community in Guam, and there must be greater consideration (and concessions) from DoD when analyzing the significant impacts that have so far been dismissed by those writing the EIS and those handling comments in public meetings.
D. Vice	Submitted via Website	The continued growth of DoD's footprint in the Marianas is being pushed without any real consideration of the cumulative effect on the region's natural resources. By generating volume after volume of essentially unreadable NEPA documents that are simply too overwhelming in verbage but lacking in analysis, DoD has failed to 1) Adequate assess the reasonably foreseeable actions that should be incorporated into every NEPA document, 2) link connected projects, which is contrary to NEPA (compartmentalizing), and 3) Put together any real analysis which could give the public an understanding of what the TOTAL impact of DoD will be on Guam and the Northern Marianas. In this document, DoD has not adequately assessed the real impacts to local fisherman, as large tracts of important fishing grounds will become restricted, which is unacceptable to local fisherman, especially given the immense amount of open ocean available to DoD in surrounding waters that could be used without significantly impacting fishermen. Public comments were delivered by multiple individuals in earlier scoping meetings, and they appear to have been completely ignored. The potential loss of important offshore fishing sites, coupled with the forthcoming SEIS for the Guam Build-Up, which will identify Ritidian Point as a SDZ for the firing range, will further erode the local fishing communities ability to engage in lawful activities in an ocean not owned by the DoD. This is simply not acceptable, and DoD must do a better job analyzing the impacts of their proposed actions, assess the TOTAL impacts under all proposed, past, and foreseeable projects, and make considerations (concessions) to the fishing public that will not restrict access to important fishing areas.
K. Wang	Submitted via Website	I do not support the proposed Mariana Islands training and testing activities. I recommend the "no action alternative." However my recommendation of this alternative does not mean I support the ongoing training activities already occuring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our Islands. Please note there are histories, cultures and people living on these islands and are their dear home and do not deserve to be constantly bombarded by these military pollution. Would you like it if another civilization were to do the same behind your backyard?

L. Wang	Submitted via Website	I am of the strong opinion that as a nation we cannot continue to undermine the ecologies of the world system even with items deemed to be in the strategic interest of this country. The things that we do in the name of strategic interests are proving to undermine our strategic interests. Thank you, Larry Wang
L. Wang	Submitted via Website	I hold the strong belief that we as a nation cannot continue to undermine the ecologies of this planet, even if these actions are deemed to be in the strategic interest of our country. I would go further to say that much of what we do in the belief that we are advancing our strategic interests actually are undermining those interests. Thank you
A. Whaley	Submitted via Website	I do not support the proposed Mariana Islands Training and Testing activities. I recommend the 'No Action Alternative.' However, my recommendation of this alternative does not mean I support the ongoing training activities already occurring in the Mariana Islands. The Navy's training and testing activities pose severe threats to our islands.
T. Williams (NY4whales)	Submitted via Website	The Mariana Islands represent one of the most ecologically rich locations on earth. Pristine waters, unbelievable beauty in the middle of the Pacific Ocean - including the Marianas Trench Marine National Monument - an abundance of marine life, make this an unforgettable place. Yet, since the US assumed control of the Marianas during World War II, the Navy has been systematically destroying this enchanting place. If the military is permitted to maintain these activities, it will continue to be labeled as the "worst enemy of the environment on the planet". GONE FOREVER: most of one island, the Farallon de Medilla has already been destroyed after live-fire testing and military bombing exercises, while further naval war games have scarred and damaged large areas of open ocean. Shockingly, the Navy now wants to double its training range to nearly one million square nautical miles - an area larger than Washington, Oregon, California, Idaho, Nevada, Arizona, Montana and New Mexico combined - despite not even knowing what marine life will be lost! Scientists are continually finding new species of marine life, but in the Marianas Islands Training and Testing area, there will be nothing for scientists to investigate, judging from the past record of military destruction of its training areas (just consider Vieques, Puerto Rico). How is it that the Navy can claim that its activities, such as active sonar, will do no harm to marine life? The Navy's own testing (Scientific Research Program) found that attenuation of low frequency active sonar falls only to 150 dB at 300 miles from the source (240 dB). The ridiculous assertion that personnel will be posted as whale-lookouts represents a facetious attempt to whitewash the destructive capacity of this sonar. Who can see beyond 1 km at night? Who can see beyond less than 1 km in bad weather

		in day or night? Who will see whales 300 miles away? Scientists and biologists know what the results are when whales and dolphins are hit with 150 dB of active LF Sonar, yet the navy refuses to acknowledge this harm. Sonar will be operating 24 hours a day; when will the Navy face itself, face the assault they are committing against marine organisms, fish, and WHALES - not enemies of the US! When has the Navy actually sent planes overhead to monitor for whales during sonar exercises? No one in their right minds thinks they ever did, although it is purported part of the "monitoring" plan. It is not easy to spot whales from a plane anyway when they can stay submerged for a half hour at a time! The continual bombing of beaches and coastal regions represents the ultimate destruction of these ecosystems, and all the life that depends on them, from corals to plankton to manatees and whales. It is absurd to think the Navy is acting in any manner except reckless, irresponsible and destructive. Pagan Island's inhabitants will likely be drive out, and its endangered species endemic only to this island will be predictably driven to extinction. There is no justification under God - or any other power - that gives the US military the right to do this. Military activities in this area are immoral, cruel, inhumane and unjustified. How many times has Mid or Low Frequency Active Sonars been used to intercept incoming threats to the US? The legacy of destruction is an assault on the people - indigenous and non-native - of this vast area, and indeed further incites a fierce and growing hatred toward the US for its irresponsibility toward those they consider "collateral damage" - the ecosystems, environment, economic resources and the PEOPLE of the military training ranges they are destroying. Let's not further this horrible distinction; let's not foster the anti-US sentiment abroad by this MITT destruction. Do not grant a Letter of Authorization or permit to "take" any marine life or act in violation of any of our current environmental laws: ESA, CZMA, MMPA, NEPA.
Warren Woodward	Submitted via Website	Leave the islands alone! You bomb and shoot up enough places already.
Simon Wu	Submitted via Website	I was informed that the DOD will bomb Farallon de Medinilla, blow up mines under water and perform sonar training. The use of sonar training will result in permanent hearing loss for up to 59 whales and dolphins per year. I want to add that, if they will perform sonar training and deafen a good sum of sea animals in the process. I am strongly against this sort of training. It is not moral in my opinion. There could even be endangered species that inhabit on these large ocean ranges. Inflicting hearing loss on sea animals will definitely lower their chance of survival.

Appendix F: Training and Testing Activities Matrices

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APPENDIX F TRAINING AND TESTING ACTIVITIES MATRICES

F.1 STRESSOR BY TRAINING ACTIVITY

Table F-1: Stressors by Training Activity

Mariana Islands Training Activity	Biological Resources															Physical Resources						Human Resources							
	Acoustic Stressors						Energy Stressors		Physical Stressors				Entanglement Stressors		Ingestion Stressors	Air Quality Stressors		Sediment and Water Quality Stressors											
	Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics[1]	Physical Disturbance[1]	Accessibility[2]	Airborne Acoustics[2]	Physical Disturbance and Strike[2]	Underwater Energy[3]	In-Air Energy[3]	Physical Interactions[3]
ANTI-AIR WARFARE (AAW)																													
Air Combat Maneuver (ACM)					✓				✓							✓	✓		✓		✓				✓	✓			
Air Defense Exercise (ADEX) **					✓	✓			✓	✓						✓	✓								✓	✓			
Air Intercept Control (AIC)					✓				✓							✓	✓								✓	✓			
Gunnery Exercise (Air-to-Air) Medium-Caliber				✓	✓				✓		✓				✓	✓	✓		✓				✓	✓	✓	✓			✓
Missile Exercise (Air-to-Air)					✓	✓			✓		✓			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓
Gunnery Exercise (Surface-to-Air) Large-Caliber**				✓	✓	✓			✓	✓	✓				✓	✓	✓	✓	✓				✓	✓	✓	✓			✓
Gunnery Exercise (Surface-to-Air) Medium-Caliber**				✓	✓	✓			✓	✓	✓				✓	✓	✓	✓	✓				✓	✓	✓	✓			✓
Missile Exercise (Surface-to-Air)				✓		✓			✓	✓	✓				✓	✓	✓	✓	✓	✓			✓	✓	✓	✓			✓
STRIKE WARFARE (STW)																													
Bombing Exercise (Air-to-Ground)					✓				✓		✓					✓	✓		✓			✓	✓		✓				
Gunnery Exercise (Air-to-Ground)					✓				✓		✓					✓	✓		✓			✓	✓		✓				
Missile Exercise MISSILEX					✓	✓			✓		✓					✓	✓		✓			✓	✓		✓				
Combat Search and Rescue					✓				✓		✓														✓	✓			
AMPHIBIOUS WARFARE (AMW)																													
Naval Surface Fire Support Exercise – Land-Based Target					✓	✓				✓						✓	✓							✓	✓				✓
Amphibious Rehearsal, No Landing – Marine Air Ground Task Force**						✓			✓	✓						✓	✓						✓	✓		✓			✓
Amphibious Assault						✓			✓	✓						✓	✓						✓	✓		✓			✓
Amphibious Raid						✓				✓						✓	✓						✓	✓		✓			✓
Urban Warfare Training					✓												✓		✓	✓	✓				✓	✓			

Table F-1: Stressors by Training Activity (continued)

Mariana Islands Training Activity	Biological Resources															Physical Resources						Human Resources							
	Acoustic Stressors						Energy Stressors		Physical Stressors				Entanglement Stressors		Ingestion Stressors	Air Quality Stressors		Sediment and Water Quality Stressors											
	Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics[1]	Physical Disturbance[1]	Accessibility[2]	Airborne Acoustics[2]	Physical Disturbance and Strike[2]	Underwater Energy[3]	In-Air Energy[3]	Physical Interactions[3]
AMPHIBIOUS WARFARE (AMW) (continued)																													
Noncombatant Evacuation Operation					✓	✓				✓							✓		✓	✓	✓				✓	✓			
Humanitarian Assistance/Disaster Relief Operations					✓	✓			✓	✓						✓	✓						✓	✓		✓			✓
Unmanned Aerial Vehicle – Intelligence, Surveillance, and Reconnaissance**					✓	✓										✓	✓	✓							✓				
ANTI-SURFACE WARFARE (ASUW)																													
Gunnery Exercise (Air-to-Surface) – Small-Caliber				✓	✓	✓			✓		✓				✓	✓	✓		✓				✓	✓	✓	✓			✓
Gunnery Exercise (Air-to-Surface) – Medium-Caliber		✓		✓	✓	✓			✓	✓	✓				✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		✓
Missile Exercise (Air-to-Surface) Rocket**		✓		✓	✓	✓			✓	✓	✓				✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Missile Exercise (Air-to-Surface) MISSILEX		✓		✓	✓	✓		✓	✓	✓	✓				✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Laser Targeting (at sea)						✓		✓	✓	✓						✓	✓							✓		✓		✓	✓
Bombing Exercise (Air-to-Surface)		✓		✓	✓	✓			✓		✓				✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓	✓
Torpedo Exercise (Submarine-to-Surface)**	✓					✓				✓	✓		✓									✓	✓	✓		✓	✓		✓
Missile Exercise (Surface-to-Surface)**		✓				✓				✓	✓				✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓
Gunnery Exercise (Surface-to-Surface) Ship – Large-Caliber		✓				✓				✓	✓				✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		✓
Gunnery Exercise (Surface-to-Surface) Ship – Small- and Medium-Caliber		✓				✓				✓	✓				✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		✓
Sinking Exercise (SINKEX)		✓		✓	✓	✓			✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓
Gunnery Exercise (Surface-to-Surface) Boat – Small- and Medium-Caliber**		✓		✓		✓				✓	✓				✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		✓
Maritime Security Operations (MSO)		✓			✓	✓			✓	✓	✓				✓	✓	✓							✓	✓	✓			✓

Table F-1: Stressors by Training Activity (continued)

Mariana Islands Training Activity	Biological Resources															Physical Resources						Human Resources							
	Acoustic Stressors						Energy Stressors		Physical Stressors				Entanglement Stressors		Ingestion Stressors	Air Quality Stressors		Sediment and Water Quality Stressors											
	Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics[1]	Physical Disturbance[1]	Accessibility[2]	Airborne Acoustics[2]	Physical Disturbance and Strike[2]	Underwater Energy[3]	In-Air Energy[3]	Physical Interactions [3]
ANTI-SUBMARINE WARFARE (ASW)																													
Tracking Exercise – Helicopter	✓				✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
Torpedo Exercise – Helicopter	✓				✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
Tracking Exercise – Maritime Patrol Advanced Extended Echo Ranging Sonobuoys	✓				✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
Tracking Exercise – Maritime Patrol Aircraft	✓				✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
Torpedo Exercise – Maritime Patrol Aircraft	✓			✓	✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
Tracking Exercise – Surface	✓					✓				✓	✓					✓	✓		✓				✓	✓		✓	✓		✓
Torpedo Exercise – Surface	✓					✓				✓	✓					✓	✓		✓				✓	✓		✓	✓		✓
Tracking Exercise – Submarine	✓					✓			✓	✓	✓		✓						✓				✓			✓	✓		✓
Torpedo Exercise – Submarine	✓					✓			✓	✓	✓		✓						✓				✓			✓	✓		✓
MAJOR TRAINING EVENTS																													
Joint Expeditionary Exercise	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Joint Multi-Strike Group Exercise	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fleet Strike Group Exercise*	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Integrated Anti-Submarine Warfare Exercise*	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Ship Squadron Anti-Submarine Warfare Exercise*	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Marine Air Ground Task Force Exercise (Amphibious) – Battalion	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Special Purpose Marine Air Ground Task Force Exercise	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Urban Warfare Exercise					✓	✓											✓	✓	✓	✓					✓	✓			

Table F-1: Stressors by Training Activity (continued)

Mariana Islands Training Activity	Biological Resources															Physical Resources						Human Resources							
	Acoustic Stressors						Energy Stressors		Physical Stressors				Entanglement Stressors		Ingestion Stressors	Air Quality Stressors		Sediment and Water Quality Stressors											
	Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics[1]	Physical Disturbance[1]	Accessibility[2]	Airborne Acoustics[2]	Physical Disturbance and Strike[2]	Underwater Energy[3]	In-Air Energy[3]	Physical Interactions[3]
ELECTRONIC WARFARE (EW)																													
Electronic Warfare Operations (EW Ops)						✓	✓		✓	✓						✓	✓							✓	✓	✓			✓
Counter Targeting Flare Exercise – Aircraft					✓				✓						✓	✓	✓		✓		✓		✓	✓	✓	✓			✓
Counter Targeting Chaff Exercise – Ship						✓				✓					✓	✓	✓				✓			✓					✓
Counter Targeting Chaff Exercise – Aircraft					✓				✓						✓	✓	✓				✓				✓				✓
MINE WARFARE (MIW)																													
Civilian Port Defense**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Mine Laying					✓	✓			✓		✓					✓	✓		✓				✓	✓	✓	✓			✓
Mine Neutralization – Explosive Ordnance Disposal (EOD)		✓				✓			✓	✓	✓	✓			✓	✓	✓	✓				✓	✓	✓	✓	✓	✓		✓
Limpet Mine Neutralization System/Shock Wave Generator**		✓													✓				✓				✓	✓	✓	✓	✓		✓
Submarine Mine Exercise**	✓									✓	✓	✓															✓		✓
Airborne Mine Countermeasure – Mine Detection**	✓				✓			✓		✓		✓				✓	✓							✓	✓	✓			✓
Mine Countermeasure Exercise (MCM) – Towed Sonar**	✓					✓		✓		✓		✓				✓	✓								✓		✓		✓
Mine Countermeasure Exercise – Surface (SMCMEX) Sonar**	✓					✓				✓		✓				✓	✓								✓		✓		✓
Mine Neutralization – Remotely Operated Vehicle Sonar**	✓	✓				✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		✓
Mine Countermeasure (MCM) – Towed Mine Detection**	✓					✓			✓	✓		✓				✓	✓						✓	✓	✓	✓	✓	✓	✓

Table F-1: Stressors by Training Activity (continued)

Mariana Islands Training Activity	Biological Resources															Physical Resources						Human Resources							
	Acoustic Stressors						Energy Stressors		Physical Stressors				Entanglement Stressors		Ingestion Stressors	Air Quality Stressors		Sediment and Water Quality Stressors											
	Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics[1]	Physical Disturbance[1]	Accessibility[2]	Airborne Acoustics[2]	Physical Disturbance and Strike[2]	Underwater Energy[3]	In-Air Energy[3]	Physical Interactions[3]
NAVAL SPECIAL WARFARE (NSW)																													
Personnel Insertion/Extraction (Non-submarine)										✓																			
Parachute Insertion									✓					✓		✓	✓	✓				✓			✓	✓			
Embassy Reinforcement																	✓		✓	✓	✓				✓	✓			
Direct Action (Combat Close Quarters)																	✓		✓	✓	✓	✓	✓		✓	✓			
Direct Action (Breaching)																	✓		✓	✓	✓	✓	✓			✓	✓		
Direct Action (Tactical Air Control Party)								✓																					
Underwater Demolition Qualification/Certification		✓									✓	✓			✓	✓	✓	✓				✓	✓	✓	✓	✓	✓		✓
Intelligence, Surveillance, Reconnaissance (ISR)																													
Urban Warfare Training					✓												✓		✓	✓	✓				✓	✓			
Underwater Survey						✓																							

Table F-1: Stressors by Training Activity (continued)

Mariana Islands Training Activity	Biological Resources															Physical Resources						Human Resources							
	Acoustic Stressors						Energy Stressors		Physical Stressors				Entanglement Stressors		Ingestion Stressors	Air Quality Stressors		Sediment and Water Quality Stressors											
	Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics[1]	Physical Disturbance[1]	Accessibility[2]	Airborne Acoustics[2]	Physical Disturbance and Strike[2]	Underwater Energy[3]	In-Air Energy[3]	Physical Interactions[3]
OTHER TRAINING EXERCISES																													
Surface Ship Sonar Maintenance**	✓					✓				✓																	✓		
Submarine Sonar Maintenance**	✓									✓																	✓		
Small Boat Attack**						✓				✓					✓	✓	✓		✓										
Submarine Navigation**	✓									✓																✓	✓		✓
Search and Rescue At Sea**					✓	✓			✓		✓														✓	✓			
Precision Anchoring**						✓				✓		✓				✓	✓			✓	✓		✓	✓		✓			✓
Maneuver (Convoy, Land Navigation)																✓	✓	✓					✓			✓			✓
Water Purification**																					✓								
Field Training Exercise																	✓		✓	✓	✓				✓	✓			
Force Protection																	✓	✓	✓	✓					✓	✓			
Anti-Terrorism																	✓	✓	✓	✓					✓	✓			
Seize Airfield						✓											✓	✓	✓	✓					✓	✓			
Airfield Expeditionary																	✓	✓	✓	✓					✓	✓			
Unmanned Aerial Vehicle Operation**					✓	✓										✓	✓								✓				
Land Demolitions (Improvised Explosive Device Discovery/Disposal)																	✓												
Land Demolitions (Unexploded Ordnance) Discovery/Disposal																	✓	✓	✓	✓	✓				✓				

[1] Cultural resources stressor
[2] Socioeconomics stressor
[3] Public health and safety stressor
* Alternative 2 only
** Alternative 1 and Alternative 2 only
Note: A check indicates events that take place for all alternatives.

F.2 STRESSOR BY TESTING ACTIVITY

Table F-2: Stressors by Testing Activity

Mariana Islands Testing Activity	Biological Resources															Physical Resources						Human Resources							
	Acoustic Stressors						Energy Stressors		Physical Stressors				Entanglement Stressors		Ingestion Stressors	Air Quality Stressors		Sediment and Water Quality Stressors											
	Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics[1]	Physical Disturbance[1]	Accessibility[2]	Airborne Acoustics[2]	Physical Disturbance and Strike[2]	Underwater Energy[3]	In-Air Energy[3]	Physical Interactions[3]
NAVAL AIR SYSTEMS COMMAND																													
ANTI-SURFACE WARFARE (ASUW)																													
Air-to-Surface Missile Test**		✓		✓	✓				✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
ANTI-SUBMARINE WARFARE (ASW)																													
Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (Sonobuoys)**	✓	✓			✓				✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Anti-Submarine Warfare Torpedo Test**	✓			✓	✓				✓	✓	✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
Broad Area Maritime Surveillance (BAMS) Testing – MQ-4C Triton**					✓											✓	✓								✓				
ELECTRONIC WARFARE (EW)																													
Flare Test**					✓						✓				✓	✓	✓				✓		✓	✓	✓	✓			✓
NAVAL SEA SYSTEMS COMMAND																													
LIFE CYCLE ACTIVITIES																													
Ship Signature Testing**	✓					✓				✓						✓	✓									✓	✓		✓
ANTI-SURFACE WARFARE/ANTI-SUBMARINE WARFARE TESTING																													
Kinetic Energy Weapon Testing**				✓		✓				✓	✓					✓	✓	✓	✓	✓			✓	✓	✓	✓			✓
Torpedo Testing**	✓	✓				✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Countermeasure Testing **	✓				✓	✓			✓	✓	✓			✓	✓	✓	✓					✓	✓			✓	✓		✓
At-sea Sonar Testing**	✓					✓				✓						✓	✓									✓	✓		✓
SHIPBOARD PROTECTION SYSTEMS AND SWIMMER DEFENSE TESTING																													
Pierside Integrated Swimmer Defense**	✓		✓							✓		✓										✓	✓		✓	✓	✓		✓
NEW SHIP CONSTRUCTION																													
ASW Mission Package Testing**	✓				✓	✓			✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
MCM Mission Package Testing**	✓	✓			✓	✓	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
ASUW Mission Package Testing**		✓		✓	✓	✓			✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
OFFICE OF NAVAL RESEARCH																													
North Pacific Acoustic Lab Philippine Sea 2018–19 Experiment (Deep Water)		✓								✓		✓																	

[1] Cultural resources stressor, [2] Socioeconomics stressor, [3] Public health and safety stressor, ** Alternative 1 and Alternative 2 only, Note: A check indicates events that take place for all alternatives.

F.3 STRESSORS BY RESOURCE

Table F-3: Stressors by Resource

Stressors vs. Resources		Biological Resources																		Physical Resources							Human Resources						
		Acoustic Stressors						Energy Stressors		Physical Stressors						Entanglement Stressors		Ingestion Stressors	Invasive Species	Air Quality Stressors		Sediment and Water Quality Stressors											
		Sonar and other active acoustic sources	Explosives	Swimmer Defense airguns	Weapons firing, launch, and impact noise	Aircraft noise	Vessel noise	Electromagnetic Devices	Lasers	Aircraft and Aerial Targets	Vessels and in-water devices	Military Expended Materials	Seafloor Devices	Ground Disturbance	Wildfires	Fiberoptic cables and guidance wires	Parachutes	Military Expended Materials	Habitat, Prey availability, Invasive Species Introductions at FDM	Criteria Air Pollutants	Hazardous Air Pollutants	Explosives and explosive byproducts	Metals	Chemicals other than explosives	Other Materials	Underwater Acoustics	Physical Disturbance	Accessibility	Airborne Acoustics	Physical Disturbance and Strike	Underwater Energy	Physical Interactions
Physical	Sediments and Water Quality																					✓	✓	✓	✓							
	Air Quality																			✓	✓											
Biological	Marine Habitats		✓								✓	✓	✓																			
	Marine Mammals	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓				✓	✓	✓								
	Sea Turtles	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓				✓	✓	✓								
	Marine Birds	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓			✓														
	Marine Vegetation		✓								✓	✓	✓									✓	✓	✓	✓							
	Marine Invertebrates	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓				✓	✓	✓	✓							
	Fish	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓				✓	✓	✓	✓							
	Terrestrial		✓		✓	✓				✓		✓		✓	✓				✓													
Human	Cultural Resources		✓								✓	✓	✓	✓												✓	✓					
	Socioeconomic Resources				✓	✓	✓			✓	✓	✓														✓	✓	✓	✓	✓		
	Public Health and Safety	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓						✓	✓

Appendix G: Statistical Probability Analysis for Estimating Direct Strike Impact and Number of Potential Exposures

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APPENDIX G STATISTICAL PROBABILITY ANALYSIS FOR ESTIMATING DIRECT STRIKE IMPACT AND NUMBER OF POTENTIAL EXPOSURES

This appendix discusses the methods and results for calculating the probability of a direct strike of an animal from any military items from the proposed training and testing activities falling toward (or directed at) the sea surface. For the purposes of this appendix, military items include non-explosive practice munitions (e.g., rounds from shipboard small-arms live-fire training), sonobuoys, acoustic countermeasures, and targets. Only marine mammals and sea turtles will be analyzed using these methods because animal densities are necessary to complete the calculations, and density estimates are currently only available for marine mammals and sea turtles within the Mariana Islands Training and Testing (MITT) Study Area (Study Area). Furthermore, the analysis conducted here does not account for explosive munitions because impacts from explosives are analyzed within the United States Department of the Navy (Navy) Acoustic Effects Model.

G.1 DIRECT IMPACT ANALYSIS

A statistical probability was calculated to estimate the impact probability (P) and number of exposures (T) associated with direct impact of military items on marine animals on the sea surface within the specified training or testing area (R) in which the activities are occurring. The statistical probability analysis is based on probability theory and modified Venn diagrams with rectangular "footprint" areas for the individual animal (A) and total impact (I) inscribed inside the training or testing area (R). The analysis assumes: (1) that all animals would be at or near the surface 100 percent of the time, when in fact, marine mammals spend the majority of their time underwater; and (2) that the animals are stationary, which does not account for any movement or any potential avoidance of the training or testing activity.

1. A = length*width, where the individual animal's width (breadth) is assumed to be 20 percent of its length for marine mammals and 112 percent of its length for sea turtles. This product for A is multiplied by the number of animals N_a in the specified training or testing area (i.e., product of the highest average seasonal animal density [D] and training or testing area [R]: $N_a = D*R$) to obtain the total animal footprint area ($A*N_a = A*D*R$) in the training or testing area. As a worst case scenario, the total animal footprint area is calculated for the species with the highest average seasonal density in the training or testing area with the highest use of military items within the entire Study Area.

2. $I = N_{mun}$*length*diameter, where N_{mun} = total annual number of military items for each type, and "length" and "diameter" refer to the individual military equipment dimensions. For each type, the individual impact footprint area is multiplied by the total annual number of military items to obtain the type-specific impact footprint area ($I = N_{mun}$*length*diameter). Each training or testing activity uses one or more different types of military items, each with a specific number and dimensions, and several training and testing activities occur in a given year. When integrating over the number of military items types for the given activity (and then over the number of activities in a year), these calculations are repeated (accounting for differences in dimensions and numbers) for all military items types used, to obtain the type-specific impact footprint area (I). These impact footprint areas are summed over all military items types for the given activity, and then summed (integrated) over all activities to obtain the total impact footprint area resulting from all activities occurring in the training or testing area in a given year.

As a worst case scenario, the total impact footprint area is calculated for the training or testing area with the highest use of military items within the entire Study Area.

Though marine mammals and sea turtles are not randomly distributed in the environment, a random point calculation was chosen due to the intensive data needs that would be required for a calculation that incorporated more detailed information on an animal's or military item's spatial occurrence.

The analysis is expected to provide an overestimation of the probability of a strike for the following reasons: (1) it calculates the probability of a single military item (of all the items expended over the course of the year) hitting a single animal at its species' highest seasonal density; (2) it does not take into account the possibility that an animal may avoid military activities; (3) it does not take into account the possibility that an animal may not be at the water surface; (4) it does not take into account that most projectiles fired during training and testing activities are fired at targets, so only a very small portion of those projectiles that miss the target would hit the water with their maximum velocity and force; and (5) it does not quantitatively take into account the Navy avoiding animals that are sighted through the implementation of mitigation measures.

The likelihood of an impact is calculated as the probability (P) that the animal footprint (A) and the impact footprint (I) will intersect within the training or testing area (R). This is calculated as the area ratio A/R or I/R, respectively. Note that A (referring to an **individual** animal footprint) and I (referring to the impact footprint resulting from the **total** number of military items N_{mun}) are the relevant quantities used in the following calculations of single-animal impact probability [P], which is then multiplied by the number of animals to obtain the number of exposures (T). The probability that the random point in the training or testing area is within both types of footprints (i.e., A and I) depends on the degree of overlap of A and I. The probability that I overlaps A is calculated by adding a buffer distance around A based on one-half of the impact area (i.e., 0.5*I), such that an impact (center) occurring anywhere within the combined (overlapping) area would impact the animal. Thus, if L_i and W_i are the length and width of the impact footprint such that $L_i*W_i = 0.5*I$ and $W_i/L_i = L_a/W_a$ (i.e., similar geometry between the animal footprint and impact footprint), and if L_a and W_a are the length and width (breadth) of the individual animal such that $L_a*W_a = A$ (= individual animal footprint area), then, assuming a purely static, rectangular scenario (Scenario 1), the total area $A_{tot} = (L_a + 2*L_i)*(W_a + 2*W_i)$, and the buffer area $A_{buffer} = A_{tot} – L_a*W_a$.

Four scenarios were examined with respect to defining and setting up the overlapping combined areas of A and I:

1. **Scenario 1:** Purely static, rectangular scenario. Impact is assumed to be static (i.e., direct impact effects only; non-dynamic; no explosions or scattering of military items after the initial impact). Hence the impact footprint area (I) is assumed to be rectangular and given by the product of military items length and width (multiplied by the number of military items). $A_{tot} = (L_a + 2*L_i)*(W_a + 2*W_i)$ and $A_{buffer} = A_{tot} – L_a*W_a$

2. **Scenario 2:** Dynamic scenario with end-on collision, in which the length of the impact footprint (Li) is enhanced by Rn = 5 military items lengths to reflect forward momentum. $A_{tot} = (L_a + (1 + R_n)*L_i)*(W_a + 2*W_i)$ and $A_{buffer} = A_{tot} – L_a*W_a$

3. **Scenario 3:** Dynamic scenario with broadside collision, in which the width of the impact footprint (W_i) is enhanced by R_n = 5 military items lengths to reflect forward momentum. $A_{tot} = (L_a + 2*W_i)*(W_a + (1 + R_n)*L_i)$ and $A_{buffer} = A_{tot} – L_a*W_a$

4. **Scenario 4:** Purely static, radial scenario, in which the rectangular animal and impact footprints are replaced with circular footprints while conserving area. Define the radius (R_a) of the circular individual animal footprint such that $\pi*R_a^2 = L_a*W_a$, and define the radius (R_i) of the circular impact footprint such that $\pi *R_i^2 = 0.5*L_i*W_i = 0.5*I$. Then $A_{tot} = \pi *(R_a + R_i)^2$ and $A_{buffer} = A_{tot} – \pi *R_a^2$ (where $\pi = 3.1415927$).

Static impacts (Scenarios 1 and 4) assume no additional areal coverage effects of scattered military items beyond the initial impact. For dynamic impacts (Scenarios 2 and 3), the distance of any scattered military items must be considered by increasing the length (Scenario 2) or width (Scenario 3), depending on orientation (broadside versus end-on collision), of the impact footprint to account for the forward horizontal momentum of the falling object. Forward momentum typically accounts for five object lengths, resulting in a corresponding increase in impact area. Significantly different values may result from these two types of orientation. Both of these types of collision conditions can be calculated each with 50 percent likelihood (i.e., equal weighting between Scenarios 2 and 3, to average these potentially different values).

Impact probability P is the probability of impacting one animal with the given number, type, and dimensions of all military items used in training or testing activities occurring in the area per year, and is given by the ratio of total area (A_{tot}) to training or testing area (R): $P = A_{tot}/R$. Number of exposures is $T = N*P = N*A_{tot}/R$, where N = number of animals in the training or testing area per year (given as the product of the animal density [D] and range size [R]). Thus, $N = D*R$ and hence $T = N*P = N*A_{tot}/R = D*A_{tot}$. Using this procedure, P and T were calculated for each of the four scenarios, for Endangered Species Act (ESA)-listed marine mammals and the marine mammal and sea turtle species with the highest average seasonal density (used as the annual density value) and for each military item type. The scenario -specific P and T values were averaged over the four scenarios (using equal weighting) to obtain a single scenario -averaged annual estimate of P and T.

G.2 PARAMETERS FOR ANALYSIS

Impact probabilities (P) and number of exposures (T) were estimated by the analysis for the following parameters:

1. **Three proposed alternatives:** No Action Alternative, Alternative 1, and Alternative 2. Animal densities, animal dimensions, and military item dimensions are the same for the three alternatives.

2. **Training or Testing Area:** The MITT Study Area is an area of 1,723,577.4 square kilometers. For the sea turtle analysis, the Study Area was split into the Nearshore Area (Study Area Shallower than 200 meters [m]), and the Open Ocean (Study Area deeper than 200 m). These two training areas were chosen because there is a higher density of sea turtles in nearshore areas then in the open ocean.

3. **The following types of munitions or other items:**
    a) **Small-caliber projectiles:** up to and including 0.50 caliber rounds
    b) **Medium-caliber projectiles:** larger than 0.50 caliber rounds but smaller than 57-millimeters (mm) projectiles
    c) **Large-caliber projectiles:** includes projectiles greater than or equal to a 57 mm projectile
    d) **Missiles:** includes rockets and jet-propelled munitions

e) **Bombs:** non-explosive practice bombs and mine shapes, ranging from 10 to 2,000 pounds
f) **Torpedoes:** includes aircraft deployed torpedoes
g) **Sonobuoys:** includes aircraft deployed sonobuoys

4. **Animal species of interest:** The nine species of ESA-listed marine mammals (Humpback Whale [*Megaptera novaeangliae*], Blue Whale [*Balaenoptera musculus*], Fin Whale [*Balaenoptera physalus*], Sei Whale [*Balaenoptera borealis*], Sperm Whale [*Physeter macrocephalus*], North Pacific right whale [*Eubalaena japonica*], Hawaiian monk seal [*Monachus schauinslandi*], Dugong [*Dugong dugon*]), and the non-ESA listed marine mammal species with the highest average seasonal density (Pantropical spotted dolphin) in the Study Area. Three of the nine ESA-listed marine mammals are not expected to occur in the Study Area, and therefore were not analyzed further in this appendix (North Pacific right whale [*Eubalaena japonica*], Hawaiian monk seal [*Monachus schauinslandi*], Dugong [*Dugong dugon*]). The five sea turtle species of interest are the Green Sea Turtle (*Chelonia mydas*), the Hawksbill Sea Turtle (*Eretmochelys imbricata*), the Loggerhead Sea Turtle (*Caretta caretta*), the Olive Ridley Sea Turtle (*Lepidochelys olivacea*), and the Leatherback Sea Turtle (*Dermochelys coriacea*).

G.3 INPUT DATA

Input data for the direct strike analysis include animal species likely to be in the area and military items proposed for use under each of the three alternatives. Animal species data include: (1) species identification and status (i.e., threatened, endangered, or neither), (2) highest average seasonal density estimate for the species of interest, and (3) adult animal dimensions (length and width) for the species with the highest density. The animal's dimensions are used to calculate individual animal footprint areas (A = length*width), and animal densities are used to calculate the number of exposures (T) from the impact probability (P): T = N*P. Military items data include: (1) military items category (e.g., projectile, bomb, rocket, target), (2) military items dimensions (length and width), and (3) total number of military items used annually.

Military items input data, specifically the quantity (e.g., numbers of guns, bombs, and rockets), are different in magnitude among the three proposed alternatives (No Action Alternative, Alternative 1, and Alternative 2). All animal species input data, the military items identification and category, and military items dimensions, are the same for the three alternatives, only the quantities (i.e., total number of military items) are different.

G.4 OUTPUT DATA

Estimates of impact probability (P) and number of exposures (T) for a given species of interest were made for the specified training or testing area with the highest annual number of military items used for each of the three alternatives. The calculations derived P and T from the highest annual number of military items used in the Study Area for the given alternative. Differences in P and T among the alternatives arise from different numbers of events (and therefore military items) for the three alternatives.

Results for marine mammals and sea turtles are presented in Table G-1 and Table G-2.

Table G-1: Estimated Marine Mammal Exposures from Direct Strike of Munitions and Other Items by Alternative

Mariana Islands Training and Testing Study Area						
Species	Training			Testing		
	No Action	Alternative 1	Alternative 2	No Action	Alternative 1	Alternative 2
Humpback Whale	0.000012	0.000040	0.000038	< 0.000001	0.000001	0.000001
Blue Whale	< 0.000001	0.000001	0.000001	< 0.000001	< 0.000001	< 0.000001
Fin Whale	< 0.000001	0.000001	0.000001	< 0.000001	< 0.000001	< 0.000001
Sei Whale	< 0.000001	0.000013	0.000013	< 0.000001	< 0.000001	< 0.000001
Sperm Whale	0.000034	0.000107	0.000110	0.000001	0.000003	0.000003
Pantropical Spotted Dolphin[1]	0.000049	0.000156	0.000161	< 0.000001	0.000003	0.000003

[1] This is the non-Endangered Species Act-listed marine mammal species with the highest average seasonal density in the training and testing area of interest.

Table G-2: Estimated Sea Turtle Exposures from Direct Strike of Military Expended Materials by Area and Alternative

Mariana Islands Training and Testing Study Area						
Nearshore Area (Study Area shallower than 200 meters [m])						
Species	Training			Testing		
	No Action	Alternative 1	Alternative 2	No Action	Alternative 1	Alternative 2
Green Sea Turtle	0.00092	0.00231	0.00231	0.00001	0.00005	0.00005
Hawksbill Sea Turtle	0.00005	0.00014	0.00014	< 0.00001	< 0.00001	< 0.00001
Loggerhead Sea Turtle	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Olive Ridley Sea Turtle	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Leatherback Sea Turtle	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Open Ocean (Study Area deeper than 200 m)						
Species	Training			Testing		
	No Action	Alternative 1	Alternative 2	No Action	Alternative 1	Alternative 2
All Turtle Species	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

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Appendix H: Biological Resource Methods

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APPENDIX H BIOLOGICAL RESOURCE METHODS

Appendix H outlines the conceptual framework for assessing effects on biological resources from sound-producing activities, energy-producing activities, physical disturbance or strike, entanglement, and ingestion.

H.1 CONCEPTUAL FRAMEWORK FOR ASSESSING EFFECTS FROM SOUND-PRODUCING ACTIVITIES

This conceptual framework describes the different types of effects that are possible and the potential relationships between sound stimuli and long-term consequences for the individual and population. The conceptual framework is central to the assessment of acoustic-related effects and is consulted multiple times throughout the process. It describes potential effects and the pathways by which an acoustic stimulus or sound-producing activity can potentially affect animals. The conceptual framework qualitatively describes costs to the animal (e.g., expended energy or missed feeding opportunity) that may be associated with specific reactions. Finally, the conceptual framework outlines the conditions that may lead to long-term consequences for the individual and population if the animal cannot fully recover from the short-term effects. Within each biological resource section (e.g., marine mammals, birds, and fish,) the detailed methods to predict effects to specific taxa are derived from this conceptual framework.

An animal is considered "exposed" to a sound if the received sound level at the animal's location is above the background ambient noise level within a similar frequency band. A variety of effects may result from exposure to sound-producing activities. The severity of these effects can vary greatly between minor effects that have no real cost to the animal, to more severe effects that may have lasting consequences. Whether a marine animal is significantly affected must be determined from the best available scientific data regarding the potential physiological and behavioral responses to sound-producing activities and the possible costs and long-term consequences of those responses.

The major categories of potential effects are:

- Direct trauma
- Auditory fatigue
- Auditory masking
- Behavioral reactions
- Physiological stress

Direct trauma refers to injury to organs or tissues of an animal as a direct result of an intense sound wave or shock wave impinging upon or passing through its body. Potential impacts on an animal's internal tissues and organs are assessed by considering the characteristics of the exposure and the response characteristics of the tissues. Trauma can be mild and fully recoverable, with no long-term repercussions to the individual or population, or more severe, with the potential for lasting effects or, in some cases, mortality.

Auditory fatigue may result from over-stimulation of the delicate hair cells and tissues within the auditory system. The most familiar effect of auditory fatigue is hearing loss, also called a noise-induced threshold shift, meaning an increase in the hearing threshold.

Audible natural and artificial sounds can potentially result in auditory masking, a condition that occurs when noise interferes with an animal's ability to hear other sounds and may affect the animal's ability to communicate, such as requiring the animal to adjust the frequency or loudness of its call. Masking occurs when the perception of a sound is interfered with by a second sound, and the probability of masking increases as the two sounds increase in similarity and the masking sound increases in level. It is important to distinguish auditory fatigue, which persists after the sound exposure, from masking, which occurs only during the sound exposure.

Marine animals naturally experience physiological stress as part of their normal life histories. Changing weather and ocean conditions, exposure to diseases and naturally occurring toxins, lack of prey availability, social interactions with conspecifics (members of the same species), and interactions with predators all contribute to the stress a marine animal naturally experiences. The physiological response to a stressor, often termed the stress response, is an adaptive process that helps an animal cope with changing external and internal environmental conditions. However, too much of a stress response can be harmful to an animal, resulting in physiological dysfunction. In some cases, naturally occurring stressors can have profound impacts on animals. Sound-producing activities have the potential to provide additional stress, which must be considered, not only for its direct impact on an animal's behavior but also for contributing to an animal's chronic stress level.

A sound-producing activity can cause a variety of behavioral reactions in animals ranging from very minor and brief, to more severe reactions such as aggression or prolonged flight. The acoustic stimuli can cause a stress reaction (i.e., startle or annoyance); they may act as a cue to an animal that has experienced a stress reaction in the past to similar sounds or activities, or that acquired a learned behavioral response to the sounds from conspecifics. An animal may choose to deal with these stimuli or ignore them based on the severity of the stress response, the animal's past experience with the sound, as well as other stimuli present in the environment. If an animal chooses to react to the acoustic stimuli, then the behavioral responses fall into two categories: alteration of an ongoing behavior pattern or avoidance. The specific type and severity of these reactions helps determine the costs and ultimate consequences to the individual and population.

H.2 FLOWCHART

Figure H.2-1 is a flowchart that diagrams the process used to evaluate the potential effects on marine animals from sound-producing activities. The shape and color of each box on the flowchart represent either a decision point in the analysis (green diamonds); specific processes such as responses, costs, or recovery (blue rectangles); external factors to consider (purple parallelograms); and final outcomes for the individual or population (orange ovals and rectangles). Each box is labeled for reference throughout the appendix. For simplicity, sound is used to include not only acoustic waves but also shock waves generated from explosive sources. The supporting text in the appendix clarifies those instances where it is necessary to distinguish between the two phenomena.

Box A1, the Sound-Producing Activity, is the source of the sound stimuli and therefore the starting point in the analysis. Each of the five major categories of potential effects (i.e., direct trauma, auditory fatigue, masking, behavioral response, and stress) are presented as pathways that flow from left to right across the diagram. Pathways are not exclusive, and each must be followed until it can be concluded that an animal is not at risk for that specific effect. The vertical columns show the steps in the analysis used to examine each of the effects pathways. These steps proceed from the stimuli, to the physiological responses, to any potential behavioral responses, to the costs to the animal, to the recovery of the animal, and finally to the long-term consequences for the individual and population.

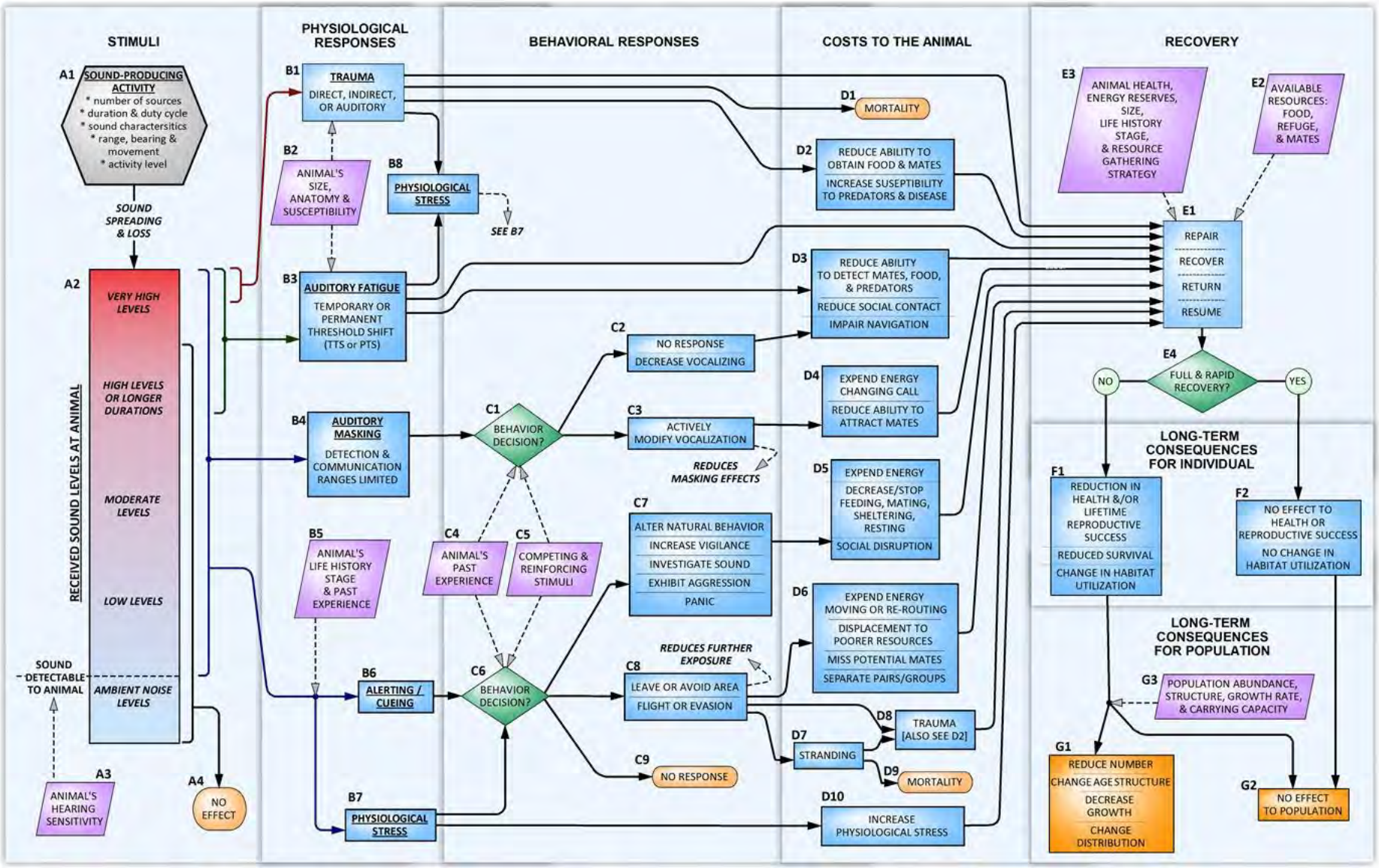

Figure H.2-1: Flow Chart of the Evaluation Process of Sound-Producing Activities

H.2.1 STIMULI

The first step in predicting whether a sound-producing activity is capable of causing an effect on a marine animal is to define the stimuli experienced by the animal. The stimuli include the sound-producing activity, the surrounding acoustical environment, and the characteristics of the sound when it reaches the animal, and whether the animal can detect the sound.

Sounds emitted from a sound-producing activity (Box A1) travel through the environment to create a spatially variable sound field. There can be any number of individual sound sources in a given activity, each with its own unique characteristics. For example, a Navy training exercise may involve several ships and aircraft, several types of sonar, and several types of ordnance. Each of the individual sound sources has unique characteristics: source level, frequency, duty cycle, duration, and rise-time (i.e., impulsive vs. non-impulsive). Each source also has a range, depth/altitude, bearing and directionality, and movement relative to the animal.

Environmental factors such as temperature, salinity, bathymetry, bottom type, and sea state all impact how sound spreads through the environment and how sound decreases in amplitude between the source and the receiver (individual animal). Mathematical calculations and computer models are used to predict how the characteristics of the sound will change between the source and the animal under a range of realistic environmental conditions for the locations where sound-producing activities occur.

The details of the overall activity may also be important to place the potential effects into context and help predict the range of severity of the probable reactions. The overall activity level (e.g., number of ships and aircraft involved in exercise); the number of sound sources within the activity; the activity duration; and the range, bearing, and movement of the activity relative to the animal are all considered.

The received sound at the animal and the number of times the sound is experienced (i.e., repetitive exposures) (Box A2) determines the range of possible effects. Sounds that are higher than the ambient noise level and within an animal's hearing sensitivity range (Box A3) have the potential to cause effects. Very high exposure levels may have the potential to cause trauma; high-level exposures, long-duration exposures, or repetitive exposures may potentially cause auditory fatigue; lower-level exposures may potentially lead to masking; all perceived levels may lead to stress; and many sounds, including sounds that are not detectable by the animal, would have no effect (Box A4).

H.2.2 PHYSIOLOGICAL RESPONSES

Physiological Responses include direct trauma, hearing loss, auditory masking, and stress. The magnitude of the involuntary response is predicted based on the characteristics of the acoustic stimuli and the characteristics of the animal (species, susceptibility, life history stage, size, and past experiences).

Trauma

Physiological responses to sound stimulation may range from mechanical vibration (with no resulting adverse effects) to tissue trauma (injury). Direct trauma (Box B1) refers to the direct injury of tissues and organs by sound waves impinging upon or traveling through an animal's body. Marine animals' bodies, especially their auditory systems, are well adapted to large hydrostatic pressures and large, but relatively slow, pressure changes that occur with changing depth. However, mechanical trauma may result from exposure to very-high-amplitude sounds when the elastic limits of the auditory system are exceeded or when animals are exposed to intense sounds with very rapid rise times, such that the tissues cannot respond adequately to the rapid pressure changes. Trauma to marine animals from sound

exposure requires high received levels. Trauma effects therefore normally only occur with very-high-amplitude, often impulsive, sources, and at relatively close range, which limits the number of animals likely exposed to trauma-inducing sound levels.

Direct trauma includes both auditory and non-auditory trauma. Auditory trauma is the direct mechanical injury to hearing-related structures, including tympanic membrane rupture, disarticulation of the middle ear ossicles, and trauma to the inner ear structures such as the organ of Corti and the associated hair cells. Auditory trauma differs from auditory fatigue in that the latter involves the overstimulation of the auditory system at levels below those capable of causing direct mechanical damage. Auditory trauma is always injurious but can be temporary. One of the most common consequences of auditory trauma is hearing loss (see below).

Non-auditory trauma can include hemorrhaging of small blood vessels and the rupture of gas-containing tissues such as the lung, swim bladder, or gastrointestinal tract. After the ear (or other sound-sensing organs), these are usually the most sensitive organs and tissues to acoustic trauma. An animal's size and anatomy are important in determining its susceptibility to trauma (Box B2), especially non-auditory trauma. Larger size indicates more tissue to protect vital organs that might be otherwise susceptible (i.e., there is more attenuation of the received sound before it impacts non-auditory structures). Therefore, larger animals should be less susceptible to trauma than smaller animals. In some cases, acoustic resonance of a structure may enhance the vibrations resulting from noise exposure and result in an increased susceptibility to trauma. Resonance is a phenomenon that exists when an object is vibrated at a frequency near its natural frequency of vibration, or the particular frequency at which the object vibrates most readily. The size, geometry, and material composition of a structure determine the frequency at which the object will resonate. The potential for resonance is determined by comparing the sound frequencies with the resonant frequency and damping of the tissues. Because most biological tissues are heavily damped, the increase in susceptibility from resonance is limited.

Vascular and tissue bubble formation resulting from sound exposure is a hypothesized mechanism of indirect trauma to marine animals. The risk of bubble formation from one of these processes, called rectified diffusion, is based on the amplitude, frequency, and duration of the sound (Crum and Mao 1996) and an animal's tissue nitrogen gas saturation at the time of the exposure. Rectified diffusion is the growth of a bubble that fluctuates in size because of the changing pressure field caused by the sound wave. An alternative, but related, hypothesis has also been suggested: stable microbubbles could be destabilized by high-level sound exposures such that bubble growth then occurs through static diffusion of gas out of gas-supersaturated tissues. Bubbles have also been hypothesized to result from changes in the dive behavior of marine mammals as a result of sound exposure (Jepson et al. 2003). Vascular bubbles produced by this mechanism would not be a physiological response to the sound exposure, but a cost to the animal because of the change in behavior (Section H.2.4, Costs to the Animal). Under either of these hypotheses, several things could happen: (1) bubbles could grow to the extent that vascular blockage (emboli) and tissue hemorrhage occur, (2) bubbles could develop to the extent that a complement immune response is triggered or the nervous tissue is subjected to enough localized pressure that pain or dysfunction occurs, or (3) the bubbles could be cleared by the lung without negative consequence to the animal. Although rectified diffusion is a known phenomenon, its applicability to diving marine animals exposed to sound is questionable; animals would need to be highly supersaturated with gas and very close to a high-level sound source (Crum et al. 2005). The other two hypothesized phenomena are largely theoretical and have not been demonstrated under realistic exposure conditions.

Auditory Fatigue

Auditory fatigue is a reduction in hearing ability resulting from overstimulation to sounds. The mechanisms responsible for auditory fatigue differ from auditory trauma and may consist of a variety of mechanical and biochemical processes, including physical damage or distortion of the tympanic membrane (not including tympanic membrane rupture) and cochlear hair cell stereocilia, oxidative stress-related hair cell death, changes in cochlear blood flow, and swelling of cochlear nerve terminals resulting from glutamate excitotoxicity (Henderson et al. 2006; Kujawa and Liberman 2009). Although the outer hair cells are the most prominent target for fatigue effects, severe noise exposures may also result in inner hair cell death and loss of auditory nerve fibers (Henderson et al. 2006). Auditory fatigue is possibly the best studied type of effect from sound exposures in marine and terrestrial animals, including humans. The characteristics of the received sound stimuli are used and compared to the animal's hearing sensitivity and susceptibility to noise (Box A3) to determine the potential for auditory fatigue.

Auditory fatigue manifests itself as hearing sensitivity loss, called a noise-induced threshold shift. A threshold shift may be either permanent threshold shift (PTS), or temporary threshold shift (TTS). Note that the term "auditory fatigue" is often used to mean a TTS; however, in this analysis, a more general meaning to differentiate fatigue mechanisms (e.g., metabolic exhaustion and distortion of tissues) from auditory trauma mechanisms (e.g., physical destruction of cochlear tissues occurring at the time of exposure) is used.

The distinction between PTS and TTS is based on whether there is a complete recovery of hearing sensitivity following a sound exposure. If the threshold shift eventually returns to zero (the animal's hearing returns to pre-exposure value), the threshold shift is a TTS. If the threshold shift does not return to zero but leaves some finite amount of threshold shift, then that remaining threshold shift is a PTS. Figure H.2-2 shows one hypothetical threshold shift that completely recovers, a TTS, and one that does not completely recover, leaving some PTS.

The relationship between TTS and PTS is complicated and poorly understood, even in humans and terrestrial mammals, where numerous studies failed to delineate a clear relationship between the two. Relatively small amounts of TTS (e.g., less than 40–50 decibels [dB] measured 2 minutes after exposure) will recover with no apparent long-term effects; however, terrestrial mammal studies revealed that large amounts of TTS (e.g., approximately 40 dB measured 24 hours after exposure) can result in permanent neural degeneration, despite the hearing thresholds returning to normal (Kujawa and Liberman 2009). The amounts of TTS induced by Kujawa and Liberman (2009) were described as being "at the limits of reversibility." It is unknown whether smaller amounts of TTS can result in similar neural degeneration, or if effects would translate to other species such as marine animals.

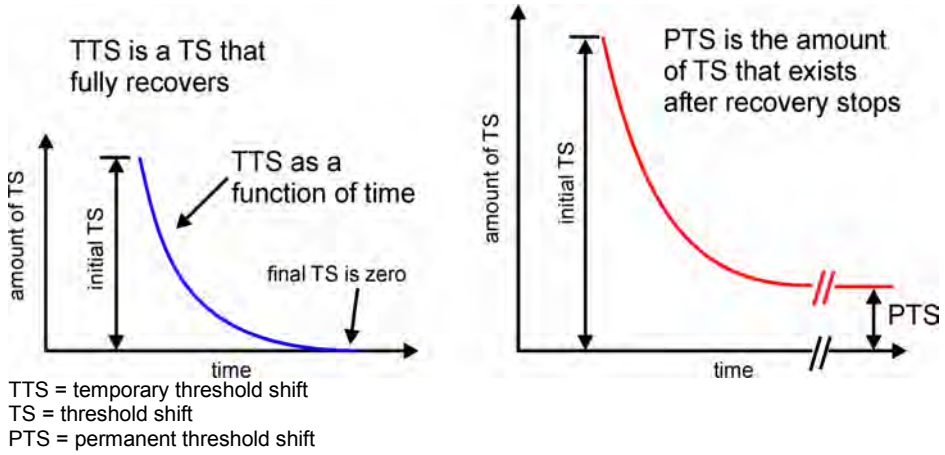

Figure H.2-2: Two Hypothetical Threshold Shifts

The amplitude, frequency, duration, and temporal pattern of the sound exposure are important parameters for predicting the potential for auditory fatigue. Duration is particularly important because auditory fatigue is exacerbated with prolonged exposure time. The frequency of the sound also plays an important role in susceptibility to hearing loss. Experiments show that animals are most susceptible to fatigue (Box B3) within their most sensitive hearing range. Sounds outside of an animal's audible frequency range do not cause fatigue.

The greater the degree of threshold shift, the smaller the ocean space within which an animal can detect biologically relevant sounds and communicate. This is referred to as reducing an animal's "acoustic space." This reduction can be estimated given the amount of threshold shift incurred by an animal.

Auditory and Communication Masking

Auditory masking occurs if the noise from an activity interferes with an animal's ability to detect, understand, elicit, or recognize biologically relevant sounds of interest (Box B4). "Noise" refers to unwanted or unimportant sounds that mask an animal's ability to hear "sounds of interest" and affect an animal's ability to generate sounds (or call). A sound of interest refers to a sound that is potentially being detected. Sounds of interest include echolocation clicks; sounds from predators; natural, abiotic sounds that may aid in navigation; and reverberation, which can give an animal information about its location and orientation within the ocean. Sounds of interest are frequently generated by conspecifics such as offspring, mates, and competitors.

The frequency, received level, and duty cycle of the noise determine the potential degree of auditory masking. Similar to hearing loss, the greater the degree of masking, the smaller the ocean space within which an animal can detect biologically relevant sounds.

Physiological Stress

If a sound is detected (i.e., heard or sensed) by an animal, a stress response can occur (Box B7); or the sound can cue or alert the animal (Box B6) without a direct, measurable stress response. If an animal suffers trauma or auditory fatigue, a physiological stress response will occur (Box B8). A stress response is a physiological change resulting from a stressor that is meant to help the animal deal with the stressor. The generalized stress response is characterized by a release of hormones (Reeder and Kramer 2005); however, it is now acknowledged that other chemicals produced in a stress response (e.g., stress markers) exist. For example, a release of reactive oxidative compounds, as occurs in noise-induced

hearing loss (Henderson et al. 2006), occurs in response to some acoustic stressors. Stress hormones include those produced by the sympathetic nervous system, norepinephrine and epinephrine (i.e., the catecholamines), which produce elevations in the heart and respiration rate, increase awareness, and increase the availability of glucose and lipid for energy. Other stress hormones are the glucocorticoid steroid hormones cortisol and aldosterone, which are produced by the adrenal gland. These hormones are classically used as an indicator of a stress response and to characterize the magnitude of the stress response (Hennessy et al. 1979). Oxidative stress occurs when reactive molecules, called reactive oxygen species, are produced in excess of molecules that counteract their activity (i.e., antioxidants).

An acute stress response is traditionally considered part of the startle response and is hormonally characterized by the release of the catecholamines. Annoyance type reactions may be characterized by the release of either or both catecholamines and glucocorticoid hormones. Regardless of the physiological changes that make up the stress response, the stress response may contribute to an animal's decision to alter its behavior. Alternatively, a stimulus may not cause a measurable stress response but may act as an alert or cue to an animal to change its behavior. This response may occur because of learned associations; the animal may have experienced a stress reaction in the past to similar sounds or activities (Box C4), or it may have learned the response from conspecifics. The severity of the stress response depends on the received sound level at the animal (Box A2); the details of the sound-producing activity (Box A1); the animal's life history stage (e.g., juvenile or adult; breeding or feeding season) (Box B5); and the animal's past experience with the stimuli (Box B5). These factors would be subject to individual variation, as well as variation within an individual over time.

An animal's life history stage is an important factor to consider when predicting whether a stress response is likely (Box B5). An animal's life history stage includes its level of physical maturity (i.e., larva, infant, juvenile, sexually mature adult) and the primary activity in which it is engaged such as mating, feeding, or rearing/caring for young. Animals engaged in a critical life activity such as mating or feeding may have a lesser stress response than an animal engaged in a more flexible activity such as resting or migrating (i.e., an activity that does not necessarily depend on the availability of resources). The animal's past experiences with the stimuli or similar stimuli are another important consideration. Prior experience with a stressor may be of particular importance because repeated experience with a stressor may dull the stress response via acclimation (St. Aubin and Dierauf 2001) or increase the response via sensitization.

H.2.3 BEHAVIORAL RESPONSES

Any number of Behavioral Responses can result from a physiological response. An animal responds to the stimulus based on a number of factors in addition to the severity of the physiological response. An animal's experience with the sound (or similar sounds), the context of the acoustic exposure, and the presence of other stimuli contribute to determining its reaction from a suite of possible behaviors.

Behavioral responses fall into two major categories: alterations in natural behavior patterns, and avoidance. These types of reactions are not mutually exclusive, and many overall reactions may be combinations of behaviors or a sequence of behaviors. Severity of behavioral reactions can vary drastically between minor and brief reorientations of the animal to investigate the sound, to severe reactions such as aggression or prolonged flight. The type and severity of the behavioral response will determine the cost to the animal.

Trauma and Auditory Fatigue

Direct trauma and auditory fatigue increases the animal's physiological stress (Box B8), which feeds into the stress response (Box B7). Direct trauma and auditory fatigue increase the likelihood or severity of a behavioral response and increase an animal's overall physiological stress level (Box D10).

Auditory Masking

A behavior decision is made by the animal when the animal detects increased background noise, or possibly when the animal recognizes that biologically relevant sounds are being masked (Box C1). An animal's past experience with the sound-producing activity or similar acoustic stimuli can affect its choice of behavior during auditory masking (Box C4). Competing and reinforcing stimuli may also affect its decision (Box C5).

An animal may exhibit a passive behavioral response when coping with auditory masking (Box C2). It may simply not respond and keep conducting its current natural behavior. An animal may also stop calling until the background noise decreases. These passive responses do not present a direct energetic cost to the animal; however, auditory masking will continue, depending on the acoustic stimuli.

An animal may to actively compensate for auditory masking (Box C3). An animal can vocalize more loudly to make its signal heard over the masking noise. An animal may also shift the frequency of its vocalizations away from the frequency of the masking noise. This shift can actually reduce the masking effect for the animal and other animals that are "listening" in the area. For example, in marine mammals, vocalization changes have been reported from exposure to human-generated noise sources such as sonar, vessel noise, and seismic surveying. Changes included mimicry of the sound, cessation of vocalization, increases and decreases in vocalization length, increases and decreases in vocalization rate, and increases in vocalization frequency and level, while other animals showed no significant changes in the presence of human-generated sound.

An animal's past experiences can be important in determining what behavior decision it may make when dealing with auditory masking (Box C4). Past experience can be with the sound-producing activity itself or with similar acoustic stimuli. For example, an animal may modify its vocalizations to reduce the effects of masking noise.

Other stimuli present in the environment can influence an animal's behavior decision (Box C5). These stimuli can be other acoustic stimuli not directly related to the sound-producing activity; they can be visual, olfactory, or tactile stimuli; the stimuli can be conspecifics or predators in the area; or the stimuli can be the strong drive to engage in a natural behavior. In some cases, natural motivations may suppress any behavioral reactions elicited by the acoustic stimulus. For example, an animal involved in mating or foraging may not react with the same degree of severity as it may have otherwise. Reinforcing stimuli reinforce the behavioral reaction caused by acoustic stimuli. For example, awareness of a predator in the area coupled with the acoustic stimuli may elicit a stronger reaction than the acoustic stimuli itself otherwise would have. The visual stimulus of seeing ships and aircraft, coupled with the acoustic stimuli, may also increase the likelihood or severity of a behavioral response.

Behavioral Reactions and Physiological Stress

A physiological stress response (Box B7) such as an annoyance or startle reaction, or a cueing or alerting reaction (Box B6) may cause an animal to make a behavior decision (Box C6). Any exposure that produces an injury or auditory fatigue is also assumed to produce a stress response (Box B7) and increase the severity or likelihood of a behavioral reaction. Both an animal's past experience (Box C4)

and competing and reinforcing stimuli (Box C5) can affect an animal's behavior decision. The decision can result in three general types of behavioral reactions: no response (Box C9), area avoidance (Box C8), or alteration of a natural behavior (Box C7).

Little data exist that correlate specific behavioral reactions with specific stress responses. Therefore, in practice, the likely range of behavioral reactions is estimated from the acoustic stimuli instead of the magnitude of the stress response. It is assumed that a stress response must exist to alter a natural behavior or cause an avoidance reaction. Estimates of the types of behavioral responses that could occur for a given sound exposure can be determined from the literature.

An animal's past experiences can be important in determining what behavior decision it may make when dealing with a stress response (Box C4). Past experience can be with the sound-producing activity itself or with similar sound stimuli. Bejder et al. (2009) define habituation as, "a process involving a reduction in response over time as individuals learn that there are neither adverse nor beneficial consequences of the occurrence of the stimulus." An animal habituated to a particular stimulus may have a lesser (or no) behavioral response to the stimulus compared to the first time the animal encountered the stimulus. Sensitization is the opposite of habituation, and refers to an increase over time in an animal's behavioral response to a repeated or continuous stimulus (Bejder et al. 2009). An animal sensitized to a particular stimulus exhibits an increasingly intense response to the stimulus (e.g., fleeing faster or farther), because there are significant consequences for the animal. A related behavioral response, tolerance, refers to an animal's ability to endure, or tolerate, a disturbance without a defined response. Habituation and sensitization are measured by the tolerance levels exhibited by animals; habituated animals show a progressively increasing tolerance to stimuli whereas sensitized animals show a progressively decreasing tolerance to stimuli (Bejder et al. 2009).

Other stimuli (Box C5) present in the environment can influence an animal's behavior decision (Box C6). These stimuli may not be directly related to the sound-producing activity, such as visual stimuli; the stimuli can be conspecifics or predators in the area, or the stimuli can be the strong drive to engage or continue in a natural behavior. In some cases, natural motivations (e.g., competing stimuli) may suppress any behavioral reactions elicited by the acoustic stimulus. For example, an animal involved in mating or foraging may not react with the same degree of severity as an animal involved in less-critical behavior. Reinforcing stimuli reinforce the behavioral reaction caused by acoustic stimuli. For example, the awareness of a predator in the area coupled with the acoustic stimuli may elicit a stronger reaction than the acoustic stimuli themselves otherwise would have.

The visual stimulus of seeing human activities such as ships and aircraft maneuvering, coupled with the acoustic stimuli, may also increase the likelihood or severity of a behavioral response. It is difficult to separate the stimulus of the sound from the visual stimulus of the ship or platform creating the sound. The sound may act as a cue, or as one stimulus of many that the animal is considering when deciding how to react. An activity with several platforms (e.g., ships and aircraft) may elicit a different reaction than an activity with a single platform, both with similar acoustic footprints. The total number of vehicles and platforms involved, the size of the activity area, and the distance between the animal and activity are important considerations when predicting behavioral responses.

An animal may reorient or become more vigilant if it detects a sound-producing activity (Box C7). Some animals may investigate the sound using other sensory systems (e.g., vision), and perhaps move closer to the sound source. Reorientation, vigilance, and investigation all require the animal to divert attention and resources and therefore slow or stop their presumably beneficial natural behavior. This can be a

very brief diversion, after which the animal continues its natural behavior, or an animal may not resume its natural behaviors until after a longer period when the animal has habituated to or learned to tolerate the sound or the activity has concluded. An intentional change via an orienting response represents behaviors that would be considered mild disruption. More severe alterations of natural behavior would include aggression or panic.

An animal may choose to leave or avoid an area where a sound-producing activity is taking place (Box C8). Avoidance is the displacement of an individual from an area. A more severe form of this comes in the form of flight or evasion. A flight response is a dramatic change in normal movement to a directed and rapid movement away from the detected location of a sound source. Avoidance of an area can help the animal avoid further acoustic effects by avoiding or reducing further exposure.

An animal may choose not to respond to a sound-producing activity (Box C9). The physiological stress response may not rise to the level that would cause the animal to modify its behavior. The animal may have habituated to the sound or simply learned through past experience that the sound is not a threat. In this case a behavioral effect would not be predicted. An animal may choose not to respond to a sound-producing activity in spite of a physiological stress response. Some combination of competing stimuli may be present such as a robust food patch or a mating opportunity that overcomes the stress response and suppresses any potential behavioral responses. If the noise-producing activity persists over long periods or reoccurs frequently, the stress felt by animals could increase their chronic stress levels.

H.2.4 COSTS TO THE ANIMAL

The potential costs to a marine animal from an involuntary or behavioral response include no measurable cost, expended energy reserves, increased stress, reduced social contact, missed opportunities to secure resources or mates, displacement, and stranding or severe evasive behavior (which may potentially lead to secondary trauma or death). Animals suffer costs on a daily basis from a host of natural situations such as dealing with predator or competitor pressure. If the costs to the animal from an acoustic-related effect fall outside of its normal daily variations, then individuals must recover from significant costs to avoid long-term consequences.

Trauma

Trauma or injury to an animal may reduce its ability to secure food by reducing its mobility or the efficiency of its sensory systems, make the injured individual less attractive to potential mates, or increase an individual's chances of contracting diseases or falling prey to a predator (Box D2). A severe trauma can lead to the death of the individual (Box D1).

Auditory Fatigue and Auditory Masking

Auditory fatigue and masking can impair an animal's ability to hear biologically important sounds (Box D3), especially fainter and distant sounds. Sounds could belong to conspecifics such as other individuals in a social group (e.g., pod, school, etc.), potential mates, potential competitors, or parents/offspring. Biologically important sounds could also be an animal's own biosonar echoes used to detect prey, sounds from predators, and sounds from the physical environment. Therefore, auditory masking or a hearing loss could reduce an animal's ability to contact social groups, offspring, or parents; and reduce opportunities to detect or attract more distant mates. Animals may also use sounds to gain information about their physical environment by detecting the reverberation of sounds in the underwater space or sensing the sound of crashing waves on a nearby shoreline. These cues could be used by some animals to migrate long distances or navigate their immediate environment. Therefore, an animal's ability to

navigate may be impaired if the animal uses acoustic cues from the physical environment to help identify its location. Auditory masking and fatigue both effectively reduce the animal's acoustic space and the ocean volume in which detection and communication are effective.

An animal that modifies its vocalization in response to auditory masking could incur a cost (Box D4). Modifying vocalizations may cost the animal energy from its finite energy budget, interfere with the behavioral function of a call, or reduce a signaler's apparent quality as a mating partner. For example, songbirds that shift their calls up an octave to compensate for increased background noise attract fewer or less-desirable mates, and many terrestrial species advertise body size and quality with low-frequency vocalizations (Slabbekoorn and Ripmeester 2008). Increasing the frequency of these vocalizations could reduce a signaler's attractiveness in the eyes of potential mates even as it improves the overall detectability of the call.

Auditory masking or auditory fatigue may also lead to no measurable costs for an animal. Masking could be of short duration or intermittent so that continuous or repeated biologically important sounds are received by the animal between masking noise. Auditory fatigue could also be inconsequential for an animal if the frequency range affected is not critical for that animal to hear within, or the auditory fatigue is of such short duration (a few minutes) that there are no costs to the individual.

Behavioral Reactions and Physiological Stress

An animal that alters its natural behavior in response to stress or an auditory cue may slow or cease its presumably beneficial natural behavior and instead expend energy reacting to the sound-producing activity (Box D5). Beneficial natural behaviors include feeding, breeding, sheltering, and migrating. The cost of feeding disruptions depends on the energetic requirements of individuals and the potential amount of food missed during the disruption. Alteration in breeding behavior can result in delaying reproduction. The costs of a brief interruption to migrating or sheltering are less clear. Most behavior alterations also require the animal to expend energy for a nonbeneficial behavior. The amount of energy expended depends on the severity of the behavioral response.

An animal that avoids a sound-producing activity may expend additional energy moving around the area, be displaced to poorer resources, miss potential mates, or have social interactions affected (Box D6). Avoidance reactions can cause an animal to expend energy. The amount of energy expended depends on the severity of the behavioral response. Missing potential mates can result in delaying reproduction. Social groups or pairs of animals, such as mates or parent/offspring pairs, could be separated during a severe behavioral response such as flight. Offspring that depend on their parents may die if they are permanently separated. Splitting up an animal group can result in a reduced group size, which can have secondary effects on individual foraging success and susceptibility to predators.

Some severe behavioral reactions can lead to stranding (Box D7) or secondary trauma (Box D8). Animals that take prolonged flight, a severe avoidance reaction, may injure themselves or strand in an environment for which they are not adapted. Some trauma is likely to occur to an animal that strands (Box D8). Trauma can reduce the animal's ability to secure food and mates, and increase the animal's susceptibility to predation and disease (Box D2). An animal that strands and does not return to a hospitable environment quickly will likely die (Box D9).

Elevated stress levels may occur whether or not an animal exhibits a behavioral response (Box D10). Even while undergoing a stress response, competing stimuli (e.g., food or mating opportunities) may overcome an animal's initial stress response during the behavior decision. Regardless of whether the

animal displays a behavioral reaction, this tolerated stress could incur a cost to the animal. Reactive oxygen species produced during normal physiological processes are generally counterbalanced by enzymes and antioxidants; however, excess stress can result in an excess production of reactive oxygen species, leading to damage of lipids, proteins, and nucleic acids at the cellular level (Sies 1997; Touyz 2004).

H.2.5 RECOVERY

The predicted recovery of the animal (Box E1) is based on the cost of any masking or behavioral response and the severity of any involuntary physiological reactions (e.g., direct trauma, hearing loss, or increased chronic stress). Many effects are fully recoverable upon cessation of the sound-producing activity, and the vast majority of effects are completely recoverable over time; whereas a few effects may not be fully recoverable. The availability of resources and the characteristics of the animal play a critical role in determining the speed and completeness of recovery.

Available resources fluctuate by season, location, and year and can play a major role in an animal's rate of recovery (Box E2). Plentiful food can aid in a quicker recovery, whereas recovery can take much longer if food resources are limited. If many potential mates are available, an animal may recover quickly from missing a single mating opportunity. Refuge or shelter is also an important resource that may give an animal an opportunity to recover or repair after an incurred cost or physiological response.

An animal's health, energy reserves, size, life history stage, and resource gathering strategy affect its speed and completeness of recovery (Box E3). Animals that are in good health and have abundant energy reserves before an effect will likely recover more quickly. Adult animals with stored energy reserves (e.g., fat reserves) may have an easier time recovering than juveniles that expend their energy growing and developing and have less in reserve. Large individuals and large species may recover more quickly, also due to having more potential for energy reserves. Animals that gather and store resources, perhaps fasting for months during breeding or offspring rearing seasons, may have a more difficult time recovering from being temporarily displaced from a feeding area than an animal that feeds year round.

Damaged tissues from mild to moderate trauma may heal over time. The predicted recovery of direct trauma is based on the severity of the trauma, availability of resources, and characteristics of the animal. After a sustained injury an animal's body attempts to repair tissues. The animal may also need to recover from any potential costs due to a decrease in resource gathering efficiency and any secondary effects from predators or disease (Box E1). Moderate to severe trauma that does not cause mortality may never fully heal.

Small to moderate amounts of hearing loss may recover over a period of minutes to days, depending on the nature of the exposure and the amount of initial threshold shift. Severe noise-induced hearing loss may not fully recover, resulting in some amount of permanent hearing loss.

Auditory masking only occurs when the sound source is operating; therefore, direct masking effects stop immediately upon cessation of the sound-producing activity (Box E1). Natural behaviors may resume shortly after or even during the acoustic stimulus after an initial assessment period by the animal. Any energetic expenditures and missed opportunities to find and secure resources incurred from masking or a behavior alteration may take some time to recover.

Animals displaced from their normal habitat due to an avoidance reaction may return over time and resume their natural behaviors, depending on the severity of the reaction and how often the activity is

repeated in the area. In areas of repeated and frequent acoustic disturbance, some animals may habituate to or learn to tolerate the new baseline or fluctuations in noise level. More sensitive species, or animals that may have been sensitized to the stimulus over time due to past negative experiences, may not return to an area. Other animals may return but not resume use of the habitat in the same manner as before the acoustic-related effect. For example, an animal may return to an area to feed or navigate through it to get to another area, but that animal may no longer seek that area as refuge or shelter.

Frequent milder physiological responses to an individual may accumulate over time if the time between sound-producing activities is not adequate to give the animal an opportunity to fully recover. An increase in an animal's chronic stress level is also possible if stress caused by a sound-producing activity does not return to baseline between exposures. Each component of the stress response is variable in time, and stress hormones return to baseline levels at different rates. For example, adrenaline is released almost immediately and is used or cleared by the system quickly, whereas glucocorticoid and cortisol levels may take long periods (i.e., hours to days) to return to baseline.

H.2.6 LONG-TERM CONSEQUENCES TO THE INDIVIDUAL AND THE POPULATION

The magnitude and type of effect and the speed and completeness of recovery must be considered in predicting long-term consequences to the individual animal and its population (Box E). Animals that recover quickly and completely from explosive or acoustic-related effects will likely not suffer reductions in their health or reproductive success, or experience changes in habitat utilization (Box F2). No population-level effects would be expected if individual animals do not suffer reductions in their lifetime reproductive success or change their habitat utilization (Box G2).

Animals that do not recover quickly and fully could suffer reductions in their health and lifetime reproductive success; they could be permanently displaced or change how they utilize the environment; or they could die (Box F1).

Severe injuries can lead to reduced survivorship (longevity), elevated stress levels, and prolonged alterations in behavior that can reduce an animal’s lifetime reproductive success. An animal with decreased energy stores or a lingering injury may be less successful at mating for one or more breeding seasons, thereby decreasing the number of offspring produced over its lifetime.

An animal whose hearing does not recover quickly and fully could suffer a reduction in lifetime reproductive success, because it may no longer be able to detect the calls of a mate as well as it could prior to losing hearing sensitivity (Box F1). This example underscores the importance of the frequency of sound associated with the hearing loss and how the animal relies on those frequencies (e.g., for mating, navigating, detecting predators). An animal with decreased energy stores or a PTS may be less successful at mating for one or more breeding seasons, thereby decreasing the number of offspring it can produce over its lifetime.

As mentioned above, the indirect effects of involuntary reaction of masking ends when the acoustic stimuli conclude. The direct effects of auditory masking could have long-term consequences for individuals if the activity was continuous or occurred frequently enough; however, most of the proposed training and testing activities are normally spread over vast areas and occur infrequently in a specific area.

Missed mating opportunities can have a direct effect on reproductive success. Reducing an animal's energy reserves over longer periods can directly reduce its health and reproductive success. Some species may not enter a breeding cycle without adequate energy stores, and animals that do breed may have a decreased probability of offspring survival. Animals displaced from their preferred habitat, or those who utilize it differently, may no longer have access to the best resources. Some animals that leave or flee an area during a noise-producing activity, especially an activity that is persistent or frequent, may not return quickly or at all. This can further reduce an individual's health and lifetime reproductive success.

Frequent disruptions to natural behavior patterns may not allow an animal to fully recover between exposures, which increase the probability of causing long-term consequences to individuals. Elevated chronic stress levels are usually a result of a prolonged or repeated disturbance. Excess stress produces reactive molecules in an animal's body that can result in cellular damage (Sies 1997; Touyz 2004). Chronic elevations in the stress levels (e.g., cortisol levels) may produce long-term health consequences that can reduce lifetime reproductive success.

These long-term consequences to the individual can lead to consequences for the population (Box G1). Population dynamics and abundance play a role in determining how many individuals would need to suffer long-term consequences before there was an effect on the population (Box G1). Long-term abandonment or a change in the utilization of an area by enough individuals can change the distribution of the population. Death has an immediate effect in that no further contribution to the population is possible, which reduces the animal's lifetime reproductive success.

Carrying capacity describes the theoretical maximum number of animals of a particular species that the environment can support. When a population nears its carrying capacity, the lifetime reproductive success in individuals may decrease due to finite resources or predator-prey interactions. Population growth is naturally limited by available resources and predator pressure. If one, or a few animals, in a population are removed or gather fewer resources, then other animals in the population can take advantage of the freed resources and potentially increase their health and lifetime reproductive success. Abundant populations that are near their carrying capacity (theoretical maximum abundance) that suffer effects to a few individuals may not be affected overall.

Populations that exist well below their carrying capacity (e.g., threatened or endangered species populations) may suffer greater consequences from any lasting effects to even a few individuals. Population-level consequences can include a change in the population dynamics, a decrease in the growth rate, or a change in geographic distribution. Changing the dynamics of a population (the proportion of the population within each age group) or their geographic distribution can also have secondary effects on population growth rates.

H.3 Conceptual Framework for Assessing Effects from Energy-Producing Activities

H.3.1 Stimuli

Magnitude of the Energy Stressor

Regulations do not provide threshold criteria to determine the significance of the potential effects from activities that involve the use of varying electromagnetic frequencies or lasers. Many organisms, primarily marine vertebrates, have been studied to determine their thresholds for detecting electromagnetic fields, as reviewed by Normandeau et al. (2011); however, there are no data on

predictable responses to exposure above or below detection thresholds. The types of electromagnetic fields discussed are those from mine neutralization activities (magnetic influence minesweeping). The only types of lasers considered for analysis were low to moderate lasers (e.g., targeting systems, detection systems, laser light detection and ranging) that do not pose a risk to organisms (Swope 2010), and therefore will not be discussed further.

Location of the Energy Stressor

Evaluation of potential energy exposure risks considered the spatial overlap of the resource occurrence and electromagnetic field and high energy laser use. Wherever appropriate, specific geographic areas of potential impact were identified. The greatest potential electromagnetic energy exposure is at the source, where intensity is greatest. The strength of the electromagnetic field decreases by the inverse square law (e.g., if the distance from sensor to source increases by a factor of three, the field strength is reduced by a factor of nine [$3^2 = 9$]). The greatest potential for high energy laser exposure is at the ocean's surface, where high energy laser intensity is greatest. As the laser penetrates the water, 96 percent of the beam is absorbed, scattered, or otherwise lost (Zorn 2000; Ulrich 2004).

Behavior of the Organism

Evaluation of potential energy exposure risk considered the behavior of the organism, especially where the organism lives and feeds (e.g., surface, water column, seafloor). The analysis for electromagnetic devices considered those species with the ability to perceive or detect electromagnetic signals. The analysis for high energy lasers particularly considered those species known to inhabit the surface of the ocean.

H.3.2 Immediate Response and Costs to the Individual

Many different types of organisms (e.g., some invertebrates, fishes, turtles, birds, mammals) are sensitive to electromagnetic fields (Normandeau et al. 2011). An organism that encounters a disturbance in an electromagnetic field could respond by moving toward the source, moving away from it, or not responding at all. The types of electromagnetic devices used in the Proposed Action simulate the electromagnetic signature of a vessel passing through the water column, so the expected response would be similar to that of vessel movement. However, since there would be no actual strike potential, a physiological response would be unlikely in most cases. Recovery of an individual from encountering electromagnetic fields would be variable, but since the physiological response would likely be minimal, as reviewed by Normandeau et al. (2011), any recovery time would also be minimal.

Very little data or information are available to analyze potential impacts on organisms from exposure to high energy lasers. As with humans, the greatest laser-related concern for marine species is damage to an organism's ability to see. High energy lasers may also burn the skin, but the threshold energy level for eye damage is considerably lower, so the analysis considered that lower threshold. Recovery of the individual from eye damage or skin lesion caused by high energy lasers would be based on the severity of the injury and the incidence of secondary infection. Very few studies of this impact are available.

H.3.3 Long-Term Consequences to the Individual and Population

Long-term consequences are considered in terms of a resource's existing population level, growth and mortality rates, other stressors on the resource from the Proposed Action, cumulative impacts on the resource, and the ability of the population to recover from or adapt to impacts. Impacts of multiple or repeated stressors on individuals are cumulative. When stressors are chronic, an organism may

experience reduced growth, health, or survival, which could have population-level impacts (Billard et al. 1981), especially in the case of endangered species.

H.4 Conceptual Framework for Assessing Effects from Physical Disturbance or Strike

H.4.1 Stimuli

Size and Weight of the Objects

To determine the likelihood of a strike and the potential impacts on an organism or habitat that would result from a physical strike, the size and weight of the striking object relative to the organism or habitat must be considered. Most small organisms and early life stages would simply be displaced by the movement generated by a large object moving through, or falling into, the water because they are planktonic (floating organisms) and move with the water; however, animals that occur at or near the surface could be struck. A larger nonplanktonic organism could potentially be struck by an object since it may not be displaced by the movement of the water. Sessile (nonmobile) organisms and habitats could be struck by the object, albeit with less force, on the seafloor. The weight of the object is also a factor that would determine the severity of a strike. A strike by a heavy object would be more severe than a strike by a low-weight object (e.g., a decelerator/parachute, flare end cap, or chaff canister).

Location and Speed of the Objects

Evaluation of potential physical disturbance or strike risk considered the spatial overlap of the resource occurrence and potential striking objects. Analysis of impacts from physical disturbance or strike stressors focuses on proposed activities that may cause an organism or habitat to be struck by an object moving through the air (e.g., aircraft), water (e.g., vessels, in-water devices, towed devices), or dropped into the water (e.g., non-explosive practice munitions and seafloor devices). The area of operation, vertical distribution, and density of these items also play central roles in the likelihood of impact. Wherever appropriate, specific geographic areas of potential impact are identified. Analysis of potential physical disturbance or strike risk also considered the speed of vessels as a measure of intensity. Some vessels move slowly, while others are capable of high speeds.

Buoyancy of the Objects

Evaluation of potential physical disturbance or strike risk in the ocean considered the buoyancy of targets or expended materials during operation, which will determine whether the object will be encountered at the surface, within the water column, or on the seafloor. Once landed on the water surface, buoyant objects have the potential to strike plants and organisms that occur on the sea surface and negatively buoyant objects may strike plants and organisms within the water column or on the seafloor.

Behavior of the Organism

Evaluation of potential physical disturbance or strike risk considered where organisms occur and if they occur in the same geographic area and vertical distribution as those objects that pose strike risks.

H.4.2 Immediate Response and Costs to the Individual

Before being struck, some organisms would sense a pressure wave through the water and respond by remaining in place, moving away from the object, or moving toward it. An organism displaced a small distance by movements from an object falling into the water nearby would likely continue on with no response. However, others could be disturbed and may exhibit a generalized stress response. If the object actually hit the organism, direct injury in addition to stress may result. The function of the stress

response in vertebrates is to rapidly raise the blood sugar level to prepare the organism to flee or fight. This generally adaptive physiological response can become a liability if the stressor persists and the organism cannot return to its baseline physiological state.

Most organisms would respond to sudden physical approach or contact by darting quickly away from the stimulus. Other species may respond by freezing in place or seeking refuge. In any case, the individual must stop whatever it was doing and divert its physiological and cognitive attention to responding to the stressor. The energy costs of reacting to a stressor depend on the specific situation, but in all cases the caloric requirements of stress reactions reduce the amount of energy available to the individual for other functions such as predator avoidance, reproduction, growth, and metabolism.

The ability of an organism to return to what it was doing following a physical strike (or near miss resulting in a stress response) is a function of fitness, genetic, and environmental factors. Some organisms are more tolerant of environmental or human-caused stressors than others and become acclimated more easily. Within a species, the rate at which an individual recovers from a physical disturbance or strike may be influenced by its age, sex, reproductive state, and general condition. An organism that has reacted to a sudden disturbance by swimming at burst speed would tire after some time; its blood hormone and sugar levels may not return to normal for 24 hours. During the recovery period, the organism may not be able to attain burst speeds and could be more vulnerable to predators. If the individual were not able to regain a steady state following exposure to a physical stressor, it may suffer depressed immune function and even death.

H.4.3 Long-Term Consequences to the Population

Long-term consequences are considered in terms of a resource's existing population level, growth and mortality rates, other stressors on the resource from the Proposed Action, cumulative impacts on the resource, and the ability of the population to recover from or adapt to impacts. Impacts of multiple or repeated stressors on individuals are cumulative. When stressors are chronic, an organism may experience reduced growth, health, or survival, which could have population-level impacts (Billard et al. 1981), especially in the case of endangered species.

H.5 Conceptual Framework for Assessing Effects from Entanglement

H.5.1 Stimuli

Physical Properties of the Objects

For an organism to become entangled in military expended materials, the materials must have certain properties, such as the ability to form loops and a high breaking strength. Some items could have a relatively low breaking strength on their own, but that breaking strength could be increased if multiple loops were wrapped around an entangled organism.

Location of the Objects

Evaluation of potential entanglement risk considered the spatial overlap of the resource occurrence and military expended materials. Distribution and density of expended items play a central role in the likelihood of impact. Wherever appropriate, specific geographic areas of potential impact are identified.

Buoyancy of Objects

Evaluation of potential entanglement risk considered the buoyancy of military expended materials to determine whether the object will be encountered within the water column (including the surface) or on the seafloor. Less buoyant materials, such as torpedo guidance wires, sink rapidly to the seafloor. More

buoyant materials include less dense items (e.g., decelerators/parachutes) that are weighted and would sink slowly to the seafloor and could be entrained in currents.

Behavior of the Organism

Evaluation of potential entanglement risk considered the general behavior of the organism, including where the organism typically occurs (e.g., surface, water column, seafloor). The analysis particularly considered those species known to become entangled in nonmilitary expended materials (e.g., "marine debris") such as fishing lines, nets, rope, and other derelict fishing gear that often entangle marine organisms.

H.5.2 Immediate Response and Costs to the Individual

The potential impacts of entanglement on a given organism depend on the species and size of the organism. Species that have protruding snouts, fins, or appendages are more likely to become entangled than smooth-bodied organisms. Also, items could get entangled by an organism's mouth, if caught on teeth or baleen, with the rest of the item trailing alongside the organism. Materials similar to fishing gear, which is designed to entangle an organism, would be expected to have a greater entanglement potential than other materials. An entangled organism would likely try to free itself of the entangling object and in the process may become even more entangled, possibly leading to a stress response. The net result of being entangled by an object could be disruption of the normal behavior, injury due to lacerations, and other sublethal or lethal impacts.

H.5.3 Long-Term Consequences to the Individual and Population

Consequences of entanglement could range from an organism successfully freeing itself from the object or remaining entangled indefinitely, possibly resulting in lacerations and other sublethal or lethal impacts. Stress responses or infection from lacerations could lead to latent mortality. The analysis will focus on reasonably foreseeable long-term consequences of the direct impact, particularly those that could impact the fitness of an individual. Changes in an individual's growth, survival, annual reproductive success, or lifetime reproductive success could have population-level impacts if enough individuals are impacted. This population-level impact would vary among species and taxonomic groups.

H.6 Conceptual Framework for Assessing Effects from Ingestion

H.6.1 Stimuli

Size of the Objects

To assess the ingestion risk from military expended materials, this analysis considered the size of the object relative to the animal's ability to swallow it. Some items are too large to be ingested (e.g., non-explosive practice bombs and most targets) and impacts from these items are not discussed further. However, these items may potentially break down into smaller ingestible pieces over time. Items that are of ingestible size when they are introduced into the environment are carried forward for analysis within each resource section where applicable.

Location of the Objects

Evaluation of potential ingestion risk considered the spatial overlap of the resource occurrence and military expended materials. The distribution and density of expended items play a central role in the likelihood of impact. Wherever appropriate, specific geographic areas of potential impact were identified.

Buoyancy of the Objects

Evaluation of potential ingestion risk considered the buoyancy of military expended materials to determine whether the object will be encountered within the water column (including the surface) or on the seafloor. Less buoyant materials, such as solid metal materials (e.g., projectiles or ordnance fragments), sink rapidly to the seafloor. More buoyant materials include less dense items (e.g., target fragments and decelerators/parachutes) that may be caught in currents and gyres. These materials can remain in the water column for an indefinite period of time before sinking. However, decelerators/parachutes are weighted and would generally sink, unless that sinking is suspended, in the scenario described here.

Feeding Behavior

Evaluation of potential ingestion risk considered the feeding behavior of the organism, including where (e.g., surface, water column, seafloor) and how (e.g., filter feeding) the organism feeds and what it feeds on. The analysis particularly considered those species known to ingest nonfood items (e.g., plastic or metal items).

H.6.2 Immediate Response and Costs to the Individual

Potential impacts of ingesting foreign objects on a given organism depend on the species and size of the organism. Species that normally eat spiny hard-bodied invertebrates would be expected to have tougher mouths and guts than those that normally feed on softer prey. Materials similar in size and shape to the normal diet of an organism may be more likely to be ingested without causing harm to the animal; however, some general assumptions were made. Relatively small objects with smooth edges, such as shells or small-caliber projectiles, might pass through the digestive tract without causing harm. A small sharp-edged item may cause the individual immediate physical distress by tearing or cutting the mouth, throat, or stomach. If the object is rigid and large (relative to the individual's mouth and throat), it may block the throat or obstruct digestive processes. An object may even be enclosed by a cyst in the gut lining. The net result of ingesting large foreign objects is disruption of the normal feeding behavior, which could be sublethal or lethal.

H.6.3 Long-Term Consequences to the Individual and Population

Consequences of ingesting nonfood items could be nutrient deficiency, bioaccumulation, uptake of toxic chemicals, compaction, and mortality. The analysis focused on reasonably foreseeable long-term consequences of the direct impact, particularly those that could impact the fitness of an individual. Changes in an individual's growth, survival, annual reproductive success, or lifetime reproductive success could have population-level impacts if enough individuals were impacted. This population-level impact would vary among species and taxonomic groups.

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Appendix I: Acoustic and Explosives Primer

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APPENDIX I ACOUSTIC AND EXPLOSIVES PRIMER

This section introduces acoustic principles and terminology describing how sound travels or "propagates" in air and water. These terms and concepts are used when analyzing potential impacts due to acoustic sources and explosives used during naval testing and training. This section briefly explains the transmission of sound; introduces some of the basic mathematical formulas used to describe the transmission of sound; and defines acoustical terms, abbreviations, and units of measurement. Because seawater is a very efficient medium for the transmission of sound, the differences between transmission of sound in water and in air are discussed. Finally, it discusses the various sources of underwater sound, including physical, biological, and anthropogenic sounds.

I.1 TERMINOLOGY/GLOSSARY

Sound is an oscillation in pressure, particle displacement, or particle velocity, as well as the auditory sensation evoked by these oscillations, although not all sound waves evoke an auditory sensation (i.e., they are outside of an animal's hearing range) (ANSI S1.1-1994). Sound may be described in terms of both physical and subjective attributes. Physical attributes may be directly measured. Subjective (or sensory) attributes cannot be directly measured and require a listener to make a judgment about the sound. Physical attributes of a sound at a particular point are obtained by measuring pressure changes as sound waves pass. The following material provides a short description of some of the basic parameters of sound.

I.1.1 PARTICLE MOTION AND SOUND PRESSURE

Sound can be described as a vibration traveling through a medium (air or water in this analysis) in the form of a wave. Introducing a vibration from a sound source into water causes the water particles to vibrate, or oscillate about their original position, and collide with each other, transferring the vibration through the water in the form of a wave. As the sound wave travels through the water, the particles of water oscillate but do not actually travel with the wave. The result is a mechanical disturbance (i.e., the sound wave) that propagates away from the sound source.

Sound has two components: particle motion and pressure. Particle motion is quantified as the velocity, amount of displacement (i.e., amplitude), and direction of the displacement of the particles in the medium. The pressure component of sound is created when vibrations in the medium compress and then decompress the particles in the medium in an oscillating manner, resulting in fluctuations in pressure that propagate through the medium as a sound wave. The basic unit of sound pressure is the Pascal (Pa) (1 Pa = 1.45×10^{-4} pounds per square inch), although the most commonly encountered unit is the micropascal (µPa) (1 µPa = 1×10^{-6} Pascal). Animals with an eardrum or similar structure directly detect the pressure component of sound. Some marine fish also have specializations to detect pressure changes. Certain animals (e.g., most invertebrates and many marine fish) do not have anatomical structures that enable them to detect the pressure component of sound and are only sensitive to the particle motion component of sound. The particle motion component of sound that these animals can detect degrades more rapidly with distance from the sound source than the pressure component, such that particle motion is most detectable by these animals near the sound source. This difference in acoustic energy sensing mechanisms limits the range at which these animals can detect most sound sources analyzed in this document.

I.1.2 FREQUENCY

The number of oscillations or waves per second is called the frequency of the sound, and the metric is Hertz (Hz). One Hz is equal to one oscillation per second, and 1 kilohertz (kHz) is equal to 1,000 oscillations per second. The inverse of the frequency is the period or duration of one acoustic wave.

Frequency is the physical attribute most closely associated with the subjective attribute "pitch"; the higher the frequency, the higher the pitch. Human hearing generally spans the frequency range from 20 Hz to 20 kHz. The pitch based on these frequencies is subjectively "low" (at 20 Hz) or "high" (at 20 kHz).

Pure tones have a constant, single frequency. Complex tones contain multiple, discrete frequencies, rather than a single frequency. Broadband sounds are spread across many frequencies. The frequency range of a sound is called its bandwidth. A harmonic of a sound at a particular frequency is a multiple of that frequency (e.g., harmonic frequencies of a 2 kHz tone are 4 kHz, 6 kHz, 8 kHz, etc.). A source operating at a nominal frequency may emit several harmonic frequencies at much lower sound pressure levels.

In this document, sounds are generally described as either low- (less than 1 kHz), mid- (1 kHz–10 kHz), high- (greater than 10 kHz–100 kHz), or very high- (greater than 100 kHz) frequency. Hearing ranges of marine animals (e.g., fish, birds, and marine mammals) are quite varied and are species-dependent. For example, some fish can hear sounds below 100 Hz and some species of marine mammals have hearing capabilities that extend above 100 kHz. Discussions of sound and potential impacts must therefore focus not only on the sound pressure, but the composite frequency of the sound and the species considered.

I.1.3 DUTY CYCLE

Duty cycle describes the portion of time that a sound source actually generates sound. It is defined as the percentage of the time during which a sound is generated over a total operational period. For example, if a sound navigation and ranging (sonar) source produces a 10-second ping once every 100 seconds, the duty cycle is 10 percent. Duty cycles vary among different acoustic sources; in general, a low duty cycle is 20 percent or less and a high duty cycle is 80 percent or higher.

I.1.4 LOUDNESS

Sound levels are normally expressed in decibels (dB), a commonly misunderstood term. Although the term decibel always means the same thing, decibels may be calculated in several ways, and the explanations of each can quickly become both highly technical and confusing.

Because mammalian ears can detect large pressure ranges and humans judge the relative loudness of sounds by the ratio of the sound pressures (a logarithmic behavior), sound pressure level is described by taking the logarithm of the ratio of the sound pressure to a reference pressure (American National Standards Institute 1994). Use of a logarithmic scale compresses the wide range of pressure values into a more usable numerical scale. (The softest audible sound has a power of about 0.000000000001 watt/square meter (m^2) and the threshold of pain is around 1 watt/m^2. With the advantage of the logarithmic scale, this ratio is efficiently described as 120 dB.)

On the decibel scale, the smallest audible sound (near total silence) is 0 dB. A sound 10 times more powerful is 10 dB. A sound 100 times more powerful than near total silence is 20 dB. A sound 1,000

times more powerful than near total silence is 30 dB. Table I-1 compares common sounds to their approximate decibel rating.

Table I-1: Common In-Air Sounds and their Approximate Decibel Ratings

Source	Source Level (dB re 20 µPa at 1 m)
Near total silence	0
Whisper	15
Normal conversation	60
Lawnmower	90
Car horn	110
Rock concert	120
Gunshot	140 (peak)

Note: dB re 20 µPa at 1 m = decibels referenced to 20 micropascals at 1 meter

I.2 PREDICTING HOW SOUND TRAVELS

Sounds are produced throughout a wide range of frequencies, including frequencies beyond the audible range of a given receptor. Most sounds heard in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The intensities of each frequency add to generate perceptible sound.

The speed of sound is not affected by the intensity, amplitude, or frequency of the sound, but rather depends wholly on characteristics (e.g., the density and the compressibility) of the medium through which it is passing. Sound travels faster through a medium that is harder to compress. For example, water is more difficult to compress than air, and sound travels approximately 1,100 feet per second (ft./s [340 meters per second {m}/s]) in air and 4,900 ft./s (1,500 m/s) in seawater.

The speed of sound in air is primarily influenced by temperature, relative humidity, and pressure, because these factors affect the density and compressibility of air. Generally, the speed of sound in air increases as air temperature increases. Sound travels faster in seawater than in air, because seawater is more difficult to compress than air, making seawater a more efficient medium for the transmission of sound. As with air, the speed of sound through seawater increases with increasing temperature, and to a lesser degree, with increasing pressure and salinity.

In the simple case of sound propagating from a point source without obstruction or reflection, the sound waves take on the shape of an expanding sphere. As spherical propagation continues, the sound energy is distributed over an ever-larger area following the inverse square law: the intensity of a sound wave decreases inversely with the square of the distance between the source and the receptor. For example, doubling the distance between the receptor and a sound source results in a reduction in the intensity of the sound of one-fourth of its initial value; tripling the distance results in one-ninth of the original intensity, and so on (Figure I-1). As expected, sound intensity drops at increasing distance from the point source. In spherical propagation, sound pressure levels drop an average of 6 dB for every doubling of distance from the source. Potential impacts on sensitive receptors, then, are directly related to the distance from the receptor to the noise source, and the intensity of the noise source itself.

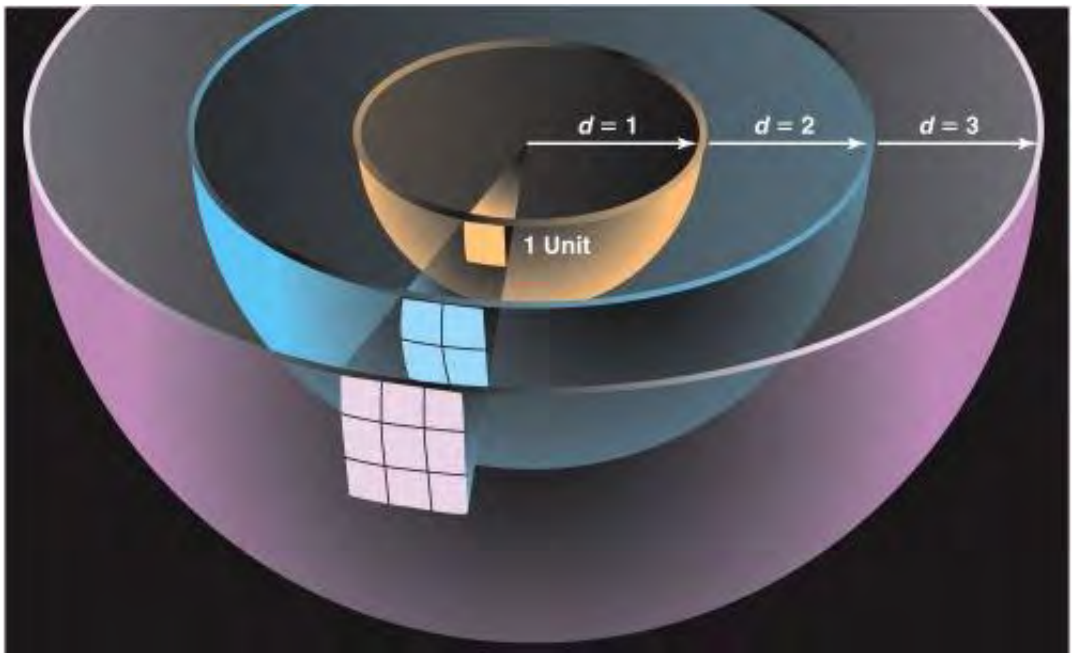


Figure I-1: Graphical Representation of the Inverse-Square Relationship in Spherical Spreading

While the concept of a sound wave traveling from its source to a receptor is relatively simple, sound propagation is quite complex because of the simultaneous presence of numerous sound waves of different frequencies and other phenomena such as reflections of sound waves and subsequent constructive (additive) or destructive (cancelling) interferences between reflected and incident waves. Other factors such as refraction, diffraction, bottom type, and surface conditions also affect sound propagation. While simple examples are provided here for illustration, the Navy Acoustic Effects Model used to quantify acoustic exposures to marine mammals and sea turtles takes into account the influence of multiple factors to predict acoustic propagation (Marine Species Modeling Team 2012).

I.2.1 SOUND ATTENUATION AND TRANSMISSION LOSS

As a sound wave passes through a medium, the intensity decreases with distance from the sound source. This phenomenon is known as attenuation or propagation loss. Sound attenuation may be described in terms of transmission loss (TL). The units of transmission loss are dB. The transmission loss is used to relate the source level (SL), defined as the sound pressure level produced by a sound source at a distance of 3.3 ft. (1 m), and the received level (RL) at a particular location, as follows:

$$RL = SL - TL$$

The main contributors to sound attenuation are as follows:

- Geometrical spreading of the sound wave as it propagates away from the source
- Sound absorption (conversion of sound energy into heat)
- Scattering, diffraction, multipath interference, boundary effects
- Other nongeometrical effects (Urick 1983)

I.2.2 SPREADING LOSS

Spreading loss is a geometrical effect representing regular weakening of a sound wave as it spreads out from a source (Campbell et al. 1988). Spreading describes the reduction in sound pressure caused by the increase in surface area as the distance from a sound source increases. Spherical and cylindrical spreading are common types of spreading loss.

As described before, a point sound source in a homogeneous medium without boundaries will radiate spherical waves—the acoustic energy spreads out from the source in the form of a spherical shell. As the distance from the source increases, the shell surface area increases. If the sound power is fixed, the sound intensity must decrease with distance from the source (intensity is power per unit area). The surface area of a sphere is $4\pi r^2$, where r is the sphere radius, so the change in intensity is proportional to the radius squared. This relationship is known as the spherical spreading law. The transmission loss for spherical spreading is:

$$TL = 20\log_{10} r$$

where *r* is the distance from the source. This is equivalent to a 6 dB reduction in sound pressure level for each doubling of distance from the sound source. For example, calculated transmission loss for spherical spreading is 40 dB at 328.1 ft. (100 m) and 46 dB at 656.2 ft. (200 m).

In cylindrical spreading, spherical waves expanding from the source are constrained by the water surface and the seafloor and take on a cylindrical shape. In this case the sound wave expands in the shape of a cylinder rather than a sphere and the transmission loss is:

$$TL = 10\log_{10} r$$

Cylindrical spreading is an approximation to wave propagation in a water-filled channel with horizontal dimensions much larger than the depth. Cylindrical spreading predicts a 3 dB reduction in sound pressure level for each doubling of distance from the source. For example, calculated transmission loss for cylindrical spreading is 20 dB at 328.1 ft. (100 m) and 23 dB at 656.2 ft. (200 m).

I.2.2.1 Reflection and Refraction

When a sound wave propagating in a medium encounters a second medium with a different density (e.g., the air-water boundary) part of the incident sound will be reflected back into the first medium and part will be transmitted into the second medium (Kinsler et al. 1982). The propagation direction will change as the sound wave enters the second medium; this phenomenon is called refraction. Refraction may also occur within a single medium if the properties of the medium change enough to cause a variation in the sound speed.

Refraction of sound resulting from spatial variations in the sound speed is one of the most important phenomena that affect sound propagation in water (Urick 1983). The sound speed in the ocean primarily depends on hydrostatic pressure (i.e., depth) and temperature. Sound speed increases with both hydrostatic pressure and temperature. In seawater, temperature has the most important effect on sound speed for depths less than about 1,000 ft. (300 m). Below 4,900 ft. (1,500 m), the hydrostatic pressure is the dominant factor because the water temperature is relatively constant. The variation of sound speed with depth in the ocean is called a sound speed profile.

Although the actual variations in sound speed are small, the existence of sound speed gradients in the ocean has an enormous effect on the propagation of sound in the ocean. If one pictures sound as rays emanating from an underwater source, the propagation of these rays changes as a function of the sound speed profile in the water column. Specifically, the directions of the rays bend toward regions of slower sound speed. This phenomenon creates ducts in which sound becomes "trapped," allowing it to propagate with high efficiency for large distances within certain depth boundaries. During winter months, the reduced sound speed at the surface due to cooling can create a surface duct that efficiently propagates sound such as shipping noise. The deep sound channel or Sound Frequency and Ranging channel is another duct that exists where sound speeds are lowest in the water column (2,000–4,000 ft. [600 m–1,200 m] depth at the mid-latitudes). Intense low-frequency underwater sounds, such as explosions, can be detected halfway around the world from their source via the Sound Frequency and Ranging channel (Baggeroer and Munk 1992).

I.2.2.2 Diffraction, Scattering, and Reverberation

Sound waves experience diffraction in much the same manner as light waves. Diffraction may be thought of as the bending of a sound wave around an obstacle. Common examples include sound heard from a source around the corner of a building and sound propagating through a small gap in an otherwise closed door or window. An obstacle or inhomogeneity (e.g., smoke, suspended particles, or gas bubbles) in the path of a sound wave causes scattering if secondary sound spreads out from it in a variety of directions (Pierce 1989). Scattering is similar to diffraction. Normally diffraction is used to describe sound bending or scattering from a single object, and scattering is used when there are multiple objects. Reverberation, or echo, refers to the prolongation of a sound that occurs when sound waves in an enclosed space are repeatedly reflected from the boundaries defining the space, even after the source has stopped emitting.

I.2.2.3 Multipath Propagation

In multipath propagation, sound may not only travel a direct path from a source to a receiver, but also be reflected from the surface or bottom multiple times before reaching the receiver (Urick 1983). At some distances, the reflected wave will be in phase with the direct wave (their waveforms add together) and at other distances the two waves will be out of phase (their waveforms cancel). The existence of multiple sound paths, or rays, arriving at a single point can result in multipath interference, a condition that permits the addition and cancellation between sound waves resulting in the fluctuation of sound levels over short distances. A special case of multipath propagation loss is called the Lloyd mirror effect, where the sound field near the water's surface reaches a minimum because of the destructive interference (cancellation) between the direct sound wave and the sound wave being reflected from the surface. This can cause the sound level to decrease dramatically within the top few meters of the water column.

I.2.2.4 Surface and Bottom Effects

Because the sea surface reflects and scatters sound, it has a major effect on the propagation of underwater sound in applications where either the source or receiver is at a shallow depth (Urick 1983). If the sea surface is smooth, the reflected sound pressure is nearly equal to the incident sound pressure; however, if the sea surface is rough, the amplitude of the reflected sound wave will be reduced.

The sea bottom is also a reflecting and scattering surface, similar to the sea surface. Sound interaction with the sea bottom is more complex, however, primarily because the acoustic properties of the sea bottom are more variable and the bottom is often layered into regions of differing density. For a hard

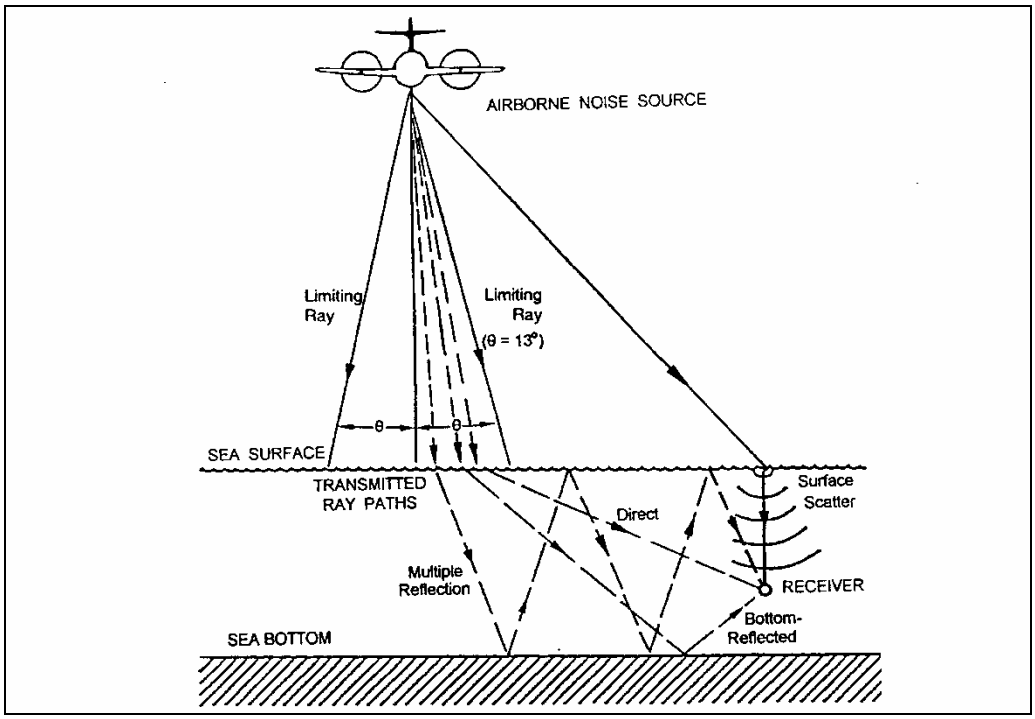
bottom such as rock, the reflected wave will be approximately in phase with the incident wave. Thus, near the ocean bottom, the incident and reflected sound pressures may add together, resulting in an increased sound pressure near the sea bottom.

I.2.2.5 Air-Water Interface

Sound from aerial sources such as aircraft, muzzle blasts, and projectile sonic booms, can be transmitted into the water. The most studied of these sources are fixed-wing aircraft and helicopters, which create noise with most energy below 500 Hz. Noise levels in water are highest at the surface and are highly dependent on the altitude of the aircraft and the angle at which the aerial sound encounters the ocean surface. Transmission of the sound once it is in the water is identical to any other sound as described in the section above.

Transmission of sound from a moving airborne source to a receptor underwater is influenced by numerous factors and has been addressed by Young (1973), Urick (1983), Richardson et al. (1995), Eller and Cavanagh (2000), Laney and Cavanagh (2000), and others. Sound is transmitted from an airborne source to a receptor underwater by four principal means: (1) a direct path, refracted upon passing through the air-water interface; (2) direct-refracted paths reflected from the bottom in shallow water; (3) evanescent transmission in which sound travels laterally close to the water surface; and (4) scattering from interface roughness due to wave motion.

Airborne sound is refracted upon transmission into water because sound waves move faster through water than through air (a ratio of about 4:1). When a sound wave hits the surface of the water at angles greater than 13 degrees from vertical, all of the sound is reflected and no sound enters the water. As a result, most of the acoustic energy transmitted into the water from an aircraft arrives through a relatively narrow cone extending vertically downward from the aircraft (Figure I-2). The intersection of this cone with the surface traces a “footprint” directly beneath the flight path, with the width of the footprint being a function of aircraft altitude. Sound may enter the water outside of this cone due to surface scattering and as evanescent waves, which travel laterally near the water surface.



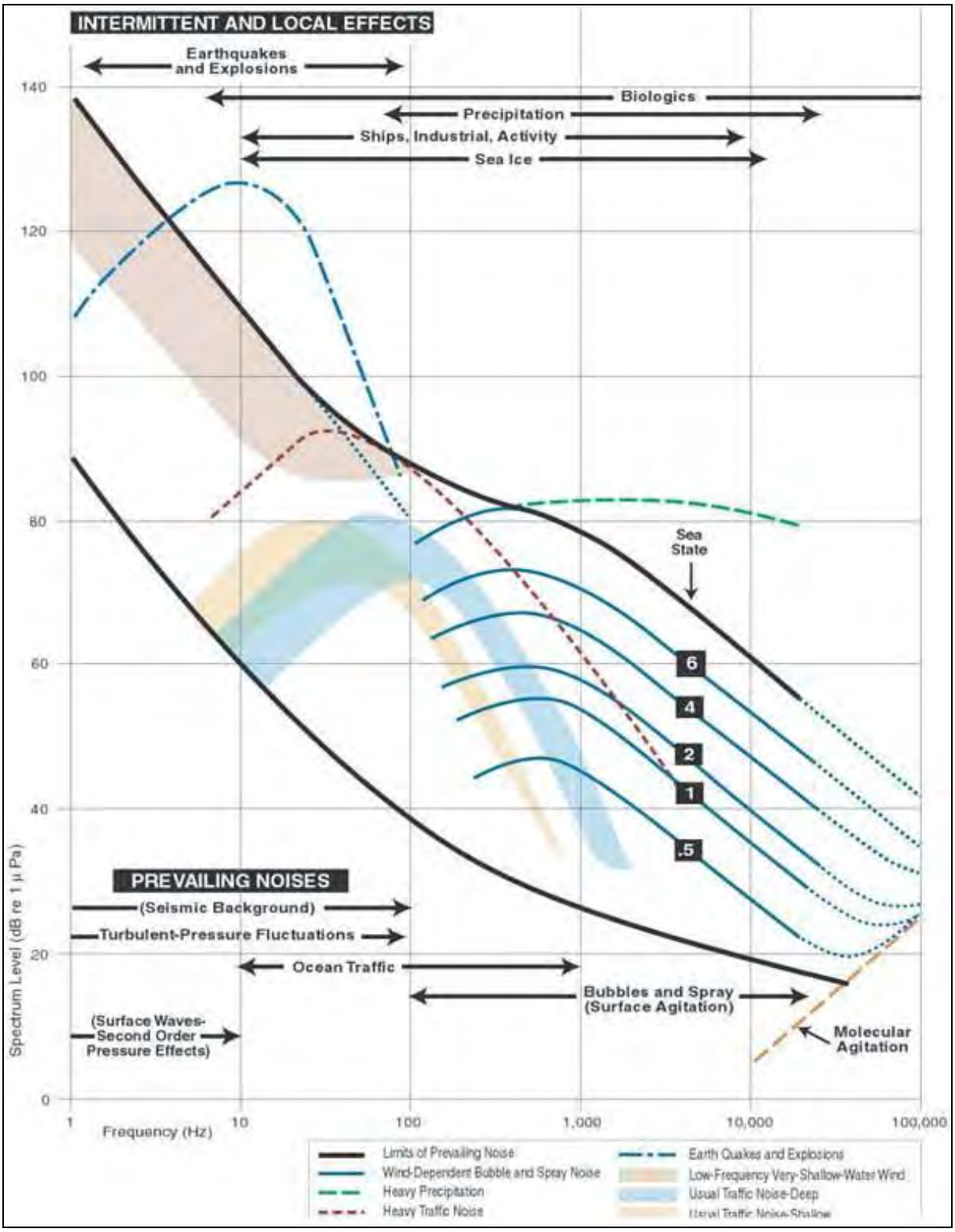
Source: Richardson et al. 1995

Figure I-2: Characteristics of Sound Transmission through the Air-Water Interface

The sound pressure field is actually doubled (+6 dB) at the air-to-water interface because of the large difference in the acoustic properties of water and air. For example, an airborne sound with a sound pressure level of 100 dB re 1 µPa at the sea surface becomes 106 dB re 1 µPa just below the surface. The pressure and sound levels then decrease with increasing distance as they would for any other in-water noise.

I.3 SOURCES OF SOUND

Ambient noise is the collection of ever-present sounds of both natural and human-generated origin. Ambient noise in the ocean comprises sound generated by natural physical, natural biological, and anthropogenic (human-generated) sources (Figure I-3). Preindustrial physical and biological noise sources in marine environments were often not high enough to interfere with the hearing of marine animals (Richardson et al. 1995). However, the increase in anthropogenic noise sources in recent times is a concern.



Source: National Research Council (2003), adapted from Wenz (1962)

Figure I-3: Oceanic Ambient Noise Levels from 1 Hertz to 100,000 Hertz, Including Frequency Ranges for Prevalent Noise Sources

Except for some sounds generated by marine mammals, most natural ocean sound is broadband (composed of a spectrum of numerous frequencies). Virtually the entire frequency spectrum is represented in ambient sound sources as shown in Figure I-3 (National Research Council 2003, adapted from Wenz 1962). Earthquakes and explosions produce sound signals from 1 Hz to 100 Hz; marine species can produce signals from 100 Hz to more than 10,000 Hz; and commercial shipping, industrial activities, and naval ships have signals between 10 Hz and 10,000 Hz (Figure I-3). Spray and bubbles associated with breaking waves are the major contributors to the ambient sound in the 500 Hz to 100,000 Hz range. At frequencies greater than 100,000 Hz, "thermal noise" caused by the random motion of water molecules is the primary source. Natural sources, especially from wave and tidal action, can cause coastal environments to have particularly high ambient sound levels.

I.3.1 UNDERWATER SOUNDS

Physical, biological, and anthropogenic sounds all contribute to the ambient underwater noise environment. Example source levels for various underwater sounds are shown in Table I-2. Many naturally occurring sounds have source levels similar to anthropogenic sounds.

Table I-2: Source Levels of Common Underwater Sounds

Source	Source Level (dB re 1 µPa at 1 m)
Ice breaker ship	193[1]
Large tanker	186[1]
Seismic airgun array (32 guns)	259 (peak)[1]
Dolphin whistles	125–173[1]
Dolphin clicks	194–219[2]
Humpback whale song	144–174[3]
Snapping shrimp	183–189[4]
Sperm whale click	236[5]
Naval mid-frequency active sonar (SQS-53)	235
Lightning strike	260[6]
Seafloor volcanic eruption	255[7]

[1] Richardson et al. 1995, [2] Rasmussen et al. 2002, [3] Payne and Payne 1985; Thompson et al. 1979, [4] Au and Banks 1998, [5] Levenson 1974; Watkins 1980, [6] Hill 1985, [7] Northrop 1974

Note: dB re 1 µPa at 1 m = decibels referenced to 1 micropascal at 1 meter

I.3.2 PHYSICAL SOURCES OF UNDERWATER SOUND

Physical processes that create sound in the ocean include rain, wind, waves, sea ice, lightning strikes at the sea surface, undersea earthquakes, and eruptions from undersea volcanoes. Generally, these sound sources contribute to a rise in the ambient sound levels on an intermittent basis. Underwater sound from rain typically is between 1 and 10 kHz. Wind produces frequencies between 100 Hz and 30 kHz, while wave-generated sound is a significant contributor in the infrasonic range (i.e., 1 to 20 Hz) (Simmonds et al. 2003). Seismic activity results in the production of low-frequency sounds that can be heard for great distances.

I.3.3 BIOLOGICAL SOURCES OF UNDERWATER SOUND

Marine animals use sound both passively and actively to navigate, communicate, locate food, reproduce, and detect predators and other important environmental cues. Sounds produced by marine species can increase ambient sound levels by nearly 20 dB over the range of a few kHz (e.g., crustaceans and fish) or over the range of tens to hundreds of kHz (e.g., dolphin clicks and whistles). For example, reproductive activity, including courtship and spawning, accounts for the majority of sounds produced by fish. During the spawning season, croakers (family Sciaenidae) vocalize for many hours and often dominate the acoustic environment (Ramcharitar et al. 2006). Other species, including baleen whales (Mysticetes) and toothed whales and dolphins (Odontocetes) produce a wide variety of sounds in many different behavioral contexts. These sounds can include tonal calls, clicks, whistles, and pulsed sounds, which cover a wide range of frequencies depending on the species and sound type produced. For instance, bottlenose dolphin clicks and whistles have a dominant frequency range of 110–130 kHz and 3.5–14.5 kHz, respectively (Au 1993). In addition, sperm whale clicks range in frequency from 0.1 kHz-30 kHz, with dominant energy in two bands (2–4 kHz and 10–16 kHz) (Richardson et al. 1995). Blue and fin whales produce low-frequency moans at frequencies of 10–25 Hz. Colonies of snapping shrimp can generate sounds at frequencies of 2–15 kHz.

I.3.4 ANTHROPOGENIC SOURCES OF UNDERWATER SOUND

In addition to sounds generated during Navy training and testing, other non-Navy activities also introduce similar types of anthropogenic (human-generated) sound into the ocean from a number of sources, including non-military vessel traffic, industrial operations onshore (pile driving), seismic profiling for oil exploration, oil drilling, underwater explosions, and in-air sources that can enter the water. Noise levels resulting from human activities in coastal and offshore areas are increasing; however, there are few historical records of ambient noise data to substantiate the level of increase. Some studies have documented increases in ambient noise off California over the last several decades (Andrew et al. 2002, McDonald et al. 2006, McDonald et al. 2008).

Commercial shipping is the most widespread source of human-made, low-frequency (0–1,000 Hz) noise in the oceans and may contribute more than 75 percent of all human-made sound in the sea (International Council for the Exploration of the Sea 2005), particularly in coastal areas and near shipping lanes (see Figure 3.12-1 for commercial shipping lanes in the Study Area). There are approximately 20,000 large commercial vessels at sea worldwide at any given time. Because low-frequency sounds carry for long distances, a large vessel emitting sound at 6.8 Hz can be detected 75–250 nautical miles away (Polefka 2004). The dominant component of low-frequency ambient noise is commercial tankers, which contribute twice as much noise as cargo vessels and at least 100 times as much noise as research vessels (Hatch et al. 2008). Most of these sounds are produced as a result of propeller cavitation (when air spaces created by the motion of propellers collapse) (Southall et al. 2007).

High-intensity, low-frequency impulse sounds are emitted during seismic surveys to determine the structure and composition of the geological formations below the sea bed to identify potential hydrocarbon reservoirs (i.e., oil and gas exploration) (Simmonds et al. 2003).

I.3.5 AERIAL SOUNDS

Aerial sounds may be produced by physical, biological, or anthropogenic sources. These sounds may be transmitted across the air-water interface as well. Of the physical sources of sound, surf noise is one of the most dominant. The highest sound levels from surf are typically low frequency (below 100 Hz). Biological sources of sound can be a significant contribution to the noise level in coastal environments

such as areas occupied by highly vocal sea lions. Anthropogenic noise sources like ships, industrial sites, cars, and airplanes are also potential contributors.

I.3.6 NAVY SOURCES OF SOUND IN THE WATER

Many of the Navy's proposed activities may introduce sound into the ocean. The type of sound will determine how that source is measured and evaluated for potential impacts to the environment. All of the Navy-produced sounds may be categorized as impulse or non-impulse. Impulse sounds feature a very rapid increase to high pressures, followed by a rapid return to the static pressure. Impulse sounds are often produced by processes involving a rapid release of energy or mechanical impacts (Hamernik and Hsueh 1991). Non-impulse sounds lack the rapid rise time and can have longer durations than impulse sounds. Non-impulse sound can be continuous or intermittent. See Figure I-4 for examples of impulse and non-impulse underwater sound sources.

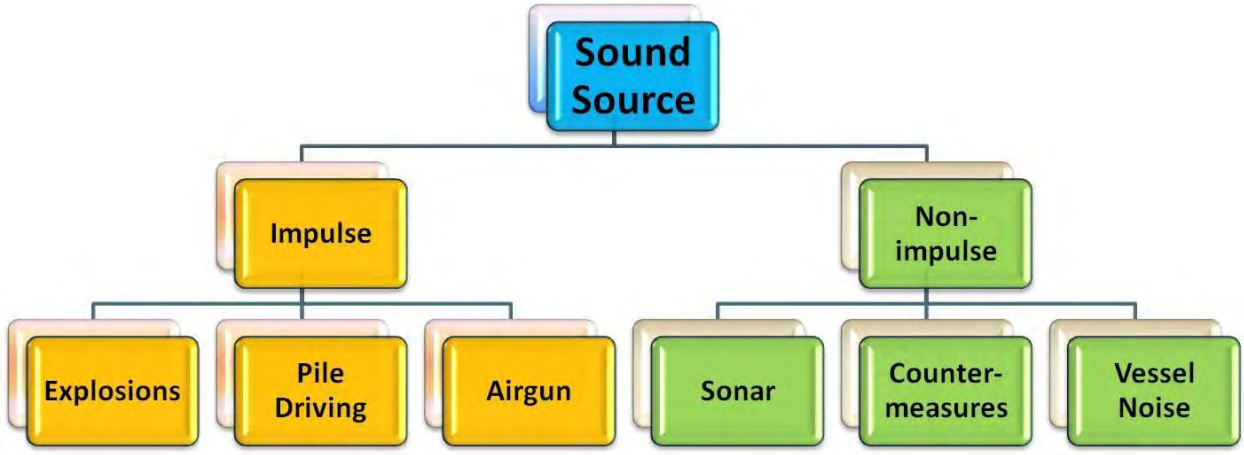


Figure I-4: Examples of Impulse and Non-impulse Sound Sources

I.4 SOUND METRICS

I.4.1 PRESSURE

Various sound pressure metrics are illustrated in Figure I-5 for a (a) non-impulse, and (b) an impulse sound. Sound pressure varies differently with time for non-impulse and impulse sounds. As shown in Figure I-5, the non-impulse sound has a relatively gradual rise in pressure from static pressure (the ambient pressure without the added sound), while the impulse sound has a near-instantaneous rise to a higher peak pressure. The peak pressure shown on both illustrations is the maximum absolute value of the instantaneous sound pressure during a specified time interval, which accounts for the values of peak pressures below the static (ambient) pressure (American National Standards Institute 1994). Peak-to-peak pressure is the difference between the maximum and minimum sound pressures. The root-mean-squared sound pressure is often used to describe the average pressure level of sounds. As the name suggests, this method takes the square root of the average squared sound pressure values over a time interval. The duration of this time interval can have a strong effect on the measured root-mean-squared sound pressure for a given sound, especially where pressure levels vary significantly, as during an impulse. If the analysis duration includes a significant portion of the waveform after the impulse has ended and the pressure has returned to near static, the root-mean-squared level would be relatively low. If the analysis duration includes the highest pressures of the impulse and excludes the portion of the waveform after the impulse has terminated, the root-mean-squared level would be comparatively

high. For this reason, it is important to specify the duration used to calculate the root-mean-squared pressure for impulse sounds.

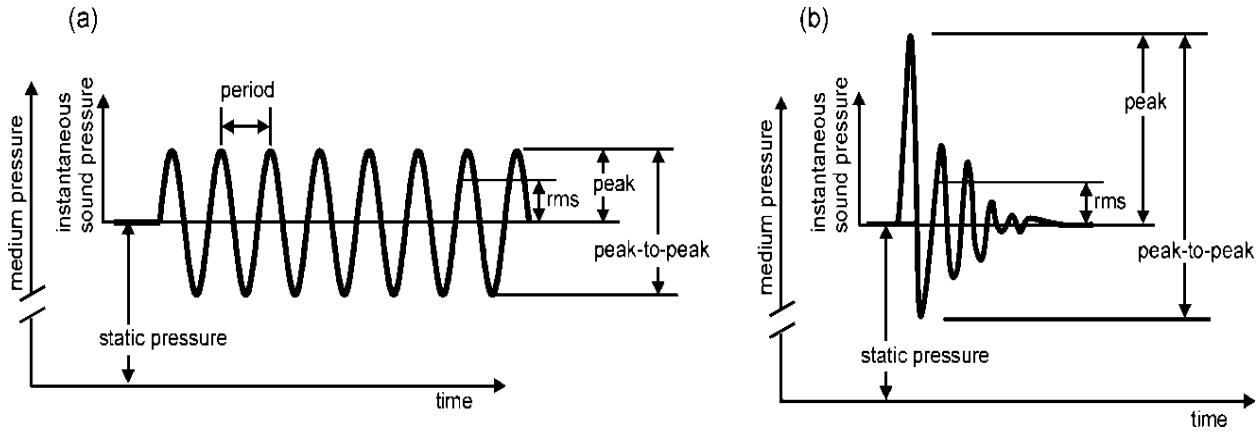


Figure I-5: Various Sound Pressure Metrics for a Hypothetical (a) Pure Tone (Non-Impulse) and (b) Impulse Sound

I.4.2 SOUND PRESSURE LEVEL

Because mammalian ears can detect large pressure ranges and humans judge the relative loudness of sounds by the ratio of the sound pressures (a logarithmic behavior), sound pressure level is described by taking the logarithm of the ratio of the sound pressure to a reference pressure (American National Standards Institute 1994). Use of a logarithmic scale compresses the wide range of pressure values into a more usable numerical scale.

Sound levels are normally expressed in dB. To express a pressure *X* in decibels using a reference pressure X_{ref}, the equation is:

$$20\log_{10}\left(\frac{X}{X_{ref}}\right)$$

The pressure *X* is the root-mean-square value of the pressure. When a value is presented in decibels, it is important to specify the value and units of the reference pressure. Normally the decibel value is given, followed by the text "re," meaning "with reference to," and the value and unit of the reference pressure. The standard reference pressures are 1 µPa for water and 20 µPa for air (American National Standards Institute 1994). It is important to note that, because of the difference in reference units between air and water, the same absolute pressures would result in different dB values for each medium.

I.4.3 SOUND EXPOSURE LEVEL

When analyzing effects on marine animals from multiple moderate-level sounds, it is necessary to have a metric that quantifies cumulative exposure(s) (American National Standards Institute 1994). The Sound Exposure Level (SEL) can be thought of as a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., a series of sonar pings) have two

main characteristics: (1) a sound level that changes throughout the event and (2) a period of time during which the source is exposed to the sound. Cumulative SEL provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. Sound exposure level is determined by calculating the decibel level of the cumulative sum-of-squared pressures over the duration of a sound, with units of dB re 1 µPa-squared second (μPa^2-s) for sounds in water.

Some rules of thumb for SEL are as follows:

- The numeric value of SEL is equal to the sound pressure level of a one-second sound that has the same total energy as the exposure event. If the sound duration is one second, sound pressure level and SEL have the same numeric value (but not the same reference quantities). For example, a one-second sound with a sound pressure level of 100 dB re 1 µPa has a SEL of 100 dB re 1 μPa^2-s.
- If the sound duration is constant but the sound pressure level changes, SEL will change by the same number of decibels as the sound pressure level.
- If the sound pressure level is held constant and the duration (*T*) changes, SEL will change as a function of $10\log_{10}(T)$:
    - $10\log_{10}(10) = 10$, so increasing duration by a factor of 10 raises SEL by 10 dB.
    - $10\log_{10}(0.1) = -10$, so decreasing duration by a factor of 10 lowers SEL by 10 dB.
    - Since $10\log_{10}(2) \approx 3$, so doubling the duration increases SEL by 3 dB.
    - $10\log_{10}(1/2) \approx -3$, so halving the duration lowers SEL by 3 dB.

Figure I-6 illustrates the summation of energy for a succession of sonar pings. In this hypothetical case, each ping has the same duration and sound pressure level. The SEL at a particular location from each individual ping is 100 dB re 1 μPa^2-s (red circles). The upper, blue curve shows the running total or cumulative SEL.

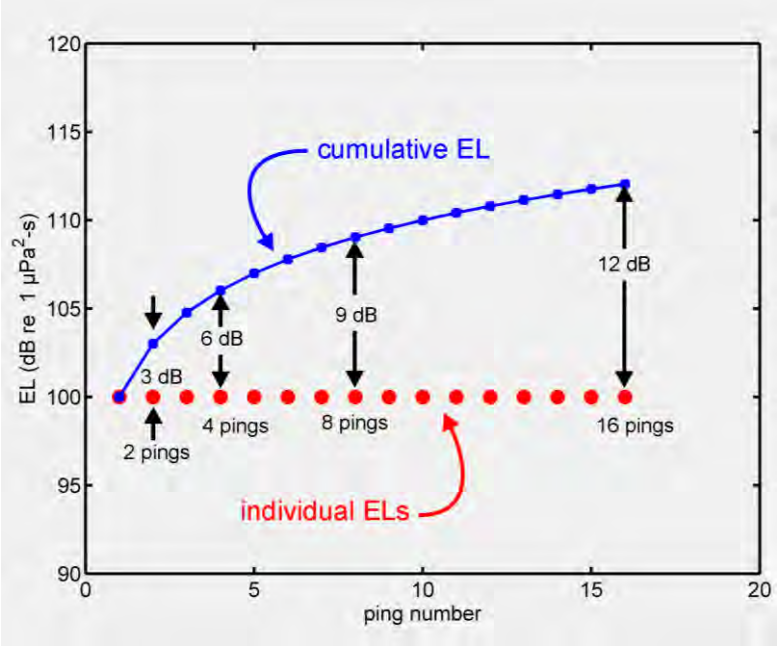


Figure I-6: Summation of Acoustic Energy (Cumulative Exposure Level, or Sound Exposure Level) from a Hypothetical, Intermittently Pinging, Stationary Sound Source (EL = Exposure Level)

After the first ping, the cumulative SEL is 100 dB re 1 µPa^2-s. Since each ping has the same duration and sound pressure level, receiving two pings is the same as receiving a single ping with twice the duration. The cumulative SEL from two pings is therefore 103 dB re 1 µPa^2-s. The cumulative SEL from four pings is 3 dB higher than the cumulative SEL from two pings, or 106 dB re 1 µPa^2-s. Each doubling of the number of pings increases the cumulative SEL by 3 dB.

Figure I-7 shows a more realistic example where the individual pings do not have the same sound pressure level or SEL. These data were recorded from a stationary hydrophone as a sound source approached, passed, and moved away from the hydrophone. As the source approached the hydrophone, the received sound pressure level from each ping increased, causing the SEL of each ping to increase. After the source passed the hydrophone, the received sound pressure level and SEL from each ping decreased as the source moved farther away (downward trend of red line), although the cumulative SEL increased with each additional ping received (slight upward trend of blue line). The main contributions are from those pings with the highest individual SELs. Individual pings with SELs 10 dB or more below the ping with the highest level contribute little (less than 0.5 dB) to the total cumulative SEL. This is shown in Figure I-7 where only a small error is introduced by summing the energy from the eight individual pings with SEL greater than 185 dB re 1 µPa^2-s (black line), as opposed to including all pings (blue line).

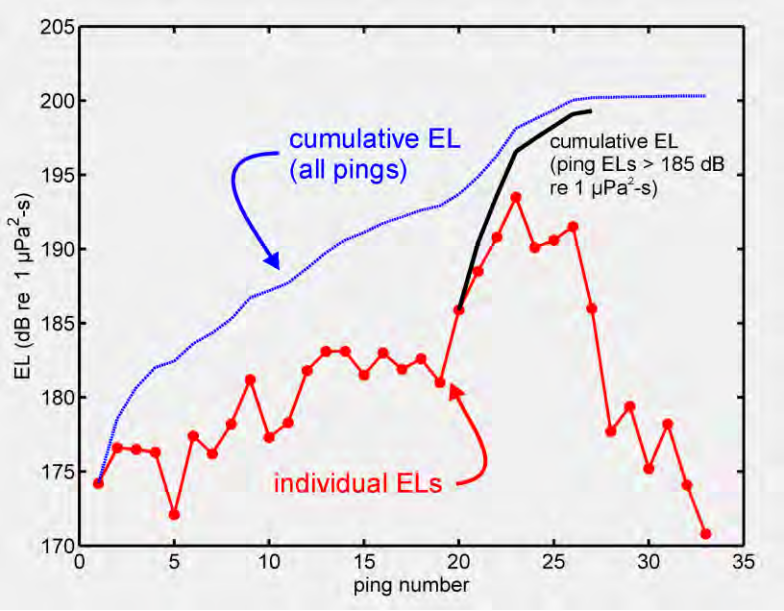


Figure I-7: Cumulative Sound Exposure Level under Realistic Conditions with a Moving, Intermittently Pinging Sound Source (Cumulative Exposure Level = Sound Exposure Level)

Impulse (Pascal-seconds)

Impulse is a metric used to describe the pressure and time component of an intense shock wave from an explosive source. The impulse calculation takes into account the magnitude and duration of the initial peak positive pressure, which is the portion of an impulse sound most likely to be associated with damage. Specifically, impulse is the time integral of the initial peak positive pressure with units Pascal-seconds. The peak positive pressure for an impulse sound is shown in Figure I-5 as the first and largest pressure peak above static pressure. This metric is used to assess potential injurious effects from explosives.

I.4.4 AUDITORY WEIGHTING FUNCTIONS

Animals, including humans, are not equally sensitive to sounds across their entire hearing range. The subjective judgment of a sound level by a receiver such as an animal is known as loudness. Two sounds received at the same sound pressure level (an objective measurement), but at two different frequencies, may be perceived by an animal at two different loudness levels depending on its hearing sensitivity (lowest sound pressure level at which a sound is first audible) at the two different frequencies. Furthermore, two different species may judge the relative loudness of the two sounds differently.

Auditory weighting functions are a method common in human hearing risk analysis to account for differences in hearing sensitivity at various frequencies. This concept can be applied to other species as well. When used in analyzing the impacts of sound on an animal, auditory weighting functions adjust received sound levels to emphasize ranges of best hearing and de-emphasize ranges of less or no sensitivity. A-weighted sound levels, often seen in units of "dBA," (A-weighted decibels) are frequency-weighted to account for the sensitivity of the human ear to a barely audible sound. Many measurements of sound in air appear as A-weighted decibels in the literature because the intent of the authors is often to assess noise impacts on humans.

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